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DEPARTMENT OF THE ARMY TECHNICAL MANUAL

BRITISH EXPLOSIVE ORDNANCE

DEPARTMENT OF THE ARMY • *JULY 1952*

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Part I—AIRCRAFT BOMBS AND PYROTECHNICS

Chapter 1

INTRODUCTION

General

In this publication British bombs are classified according to their type and usage. Each chapter of Part 1 deals with a separate type—or closely related types—of bombs in service use, with the exception of the chapters on miscellaneous bombs and obsolete bombs. The chapter on miscellaneous bombs includes two bombs which do not fall under the regular British classifications, while the chapter on obsolete bombs includes British bombs which have been declared obsolete and withdrawn from service.

Designation and Classification of British Bombs

British bombs are designated by purpose, weight, and mark number. British mark numbers, which are always written in Roman numerals, correspond roughly to the modification numbers used by the U. S. Navy, while the British weight designation corresponds to the U. S. Naval mark number. Minor changes in marks of British bombs are indicated by various symbols, consisting of lower case letters, capital letters, or asterisks.

The classification according to purpose is generally indicated by the initials of the specific type. Thus, there is a series of antisubmarine bombs designated "A.S.", a series of general purpose bombs designated "G.P.", semi-armor-piercing bombs designated "S.A.P.", aircraft depth charges designated "D.C.", etc. Occasionally, when no appropriate initials can be used, the complete name of the bomb type is employed in the designation, as "Smoke", "Practice", etc.

Therefore, in order to describe a British bomb completely, the use, weight class, and mark number must be given in that sequence; e.g., G.P. 250-lb. Mk V; I.B. 30-lb. Mk IV; Smoke 500-lb. Mk I; S.A.P. 500-lb. Mk IIC.

The following are the type classifications of British bombs and the initials used to indicate them:

Fragmentation Bombs	F.
General Purpose Bombs	G.P.
Medium Capacity Bombs	M.C.
High Capacity Bombs	H.C.
Deep Penetration Bombs	D.P.
Semi-Armor-Piercing Bombs	S.A.P.
Armor-Piercing Bombs	A.P.
Antisubmarine Bombs	A.S.
Aircraft Depth Charges	D.C.
Buoyancy Bombs	B.
Incendiary Bombs	I.B.
Smoke Bombs	Smoke
Chemical Bombs	L.C.
Practice Bombs	Practice
Infantry Training Bombs	I.T.
Target Identification Bombs	T.I.
Anti-Tank Bombs	A.T.

Construction of British Bombs

British bombs generally are highly streamlined, although the later designs, such as the M.C. bombs, are parallel sided, resembling the American G.P. bombs in external appearance. G.P. and M.C. bombs are usually of cast, one-piece construction, although some M.C. bombs may be built up in welded sections of cast or forged steel. S.A.P. and A.P. bombs are always forged in one piece and heat-treated for greater strength. The exteriors of these bombs are well machined. H.C. bombs are of thin-walled, "boiler plate" construction.

Fillings of British Bombs

A great variety of main fillings are used by the British. The most common, however, are the following: Amatol for G.P., M.C., and H.C. types; TNT for S.A.P.; and "Shellite" for A.P.

bombs. RDX/TNT combinations are also commonly employed in M.C. and H.C. bombs. Current fillings are 60/40 Amatol for H.C. bombs, and desensitized Pentolite or RDX/TNT for all others.

Suspension of British Bombs

British bombs are suspended by a single suspension lug attached to the bomb body by machine screws. Later designs of British bombs, such as the M.C. series, are fitted with additional dual suspension lugs for carrying in American planes. Crutches or sway bars are used with larger size bombs.

British Tail Assemblies

A unique type of tail assembly is regularly employed by the British, consisting of a sheet-steel cone with a cylindrical strut attached by means of four sheet-steel fins. The unique feature is the fact that the arming vanes are an integral part of the tail assembly. They are attached to the tail pistol by means of a reach rod with a fork on its lower extremity engaging a similar fork on the tail pistol. A special short tail, originally designed for use in American built planes, is sometimes used to permit a greater bomb load. A third type tail assembly, rarely used, is designed to be employed in conjunction with certain tail fuzes which have their own arming vanes. The arming vanes on this tail assembly are omitted, and the tail cone is truncated to give clearance to the vanes on the fuze.

Tail units are attached to bombs up to 1,000 lb. by a spring clip assembly, and to bombs of 1,000 lb. and over by means of bolts. Since each individual bomb is provided with its own specific tail unit, the bomb designation and tail number, which are stencilled on one of the tail fins, serve as a ready means of identifying the bomb. The word "Mark" is omitted from both the tail unit and the bomb designation. For example, the tail unit, No. 2 Mk I, used on the G.P. 500-lb. Bomb Mk IV, should appear on the tail unit as "No. 2 . 1, G.P. 500-lb. IV".

The following list includes the numbers of the tail units now in use, and the bombs with which each is used.

Tail Numbers	Bombs With Which Used
No. 1 Mk I	S.A.P. 250-lb. Mks II and III
	S.A.P. 500-lb. Mks II and III
	A.P. 2,000-lb. Mk I
	G.P. 250-lb. Mk III
	G.P. 500-lb. Mk III
	I.B. 250-lb. Mks I and II
	L.C. 250-lb. Mks I and II
No. 1 Mk II	T.I. 250-lb. Nos. 1–28
No. 2 Mk I	G.P. 250-lb. Mk IV
	G.P. 500-lb. Mk IV
	M.C. 250-lb. Mk I
	M.C. 500-lb. Mk IV
No. 2 Mk II	G.P. 250-lb. Mks IV and V
	M.C. 250-lb. Mk V
No. 4 Mk I	S.A.P. 500-lb. Mks IIC and IIIC
No. 7 Mk II	A.S. 100-lb. Mk IV
No. 8 Mk I	A.S. 250-lb. Mk IV
No. 9 Mk I	A.S. 500-lb. Mk IV
No. 10 Mk I	S.A.P. 250-lb. Mk V
	A.P. 2,000-lb. Mks II and III
No. 11 Mk I	S.A.P. 500-lb. Mk V
No. 13 Mk I	G.P. 1,000-lb. Mks I–IV
No. 14 Mk I	G.P. 1,900-lb. Mk I
No. 15 Mk I	A.P. 2,000-lb. Mks II and III
No. 23 Mk I	"B" 250-lb. Mk III
No. 24 Mk I	H.C. 4,000-lb. Mks II and IV
No. 25 Mk I	M.C. 500-lb. Mks I–IV
No. 26 Mk I	G.P. 500-lb. Mks IV and V
	M.C. 500-lb. Mk IV
No. 26 Mk II	G.P. 500-lb. Mks IV and V
No. 27 Mk I	S.A.P. 500-lb. Mk V
No. 28 Mk I	M.C. 500-lb. Mks I–III
No. 29 Mk I	G.P. 1,000-lb. Mks I–IV
No. 31 Mk I	L.C. 500-lb. Mk II
	Smoke 500-lb. Mk I
	I.B. 500-lb. Mk I
	L.C. 500-lb. Mk II
No. 32 Mk I	H.C. 2,000-lb. Mk I
No. 33 Mk I	H.C. 8,000-lb. Mks I and II
No. 34 Mk I	G.P. 4,000-lb. Mks I and II
No. 35 Mk I	T.I. 250-lb. Nos. 1-28
No. 36 Mk I	A.S. 600-lb. Mk I
No. 37 Mk I	M.C. 1,000-lb. Mk I
No. 38 Mk I	M.C. 4,000-lb. Mk I

Tail Numbers	Bombs With Which Used
No. 39 Mk I	H.C. 2,000-lb. Mks II and III
No. 40 Mk I	I.B. 30-lb. Mks III and IV
No. 41 Mk I	Smoke 120-lb. Mk I
No. 42 Mk I	Cluster Projectile No. 14 Mk I
No. 43 Mk I	Cluster Projectile No. 15 Mk I
No. 44 Mk I & II	Cluster Projectile No. 4 Mk I
No. 45 Mk I	Cluster Projectile No. 6 Mk I
No. 46 Mk II	Cluster Projectile No. 7 Mk I
No. 47 Mk I	A.P. 2,000-lb. Mk IV
No. 48 Mks II & III	Cluster Projectile No. 16 Mk II
No. 52 Mk I	H.C. 8,000-lb. Mks I and II H.C. 12,000-lb. Mk II
No. 54 Mk I	G.P. 500-lb. American (M 64)
No. 55 Mk I	G.P. 1,000-lb. American (M 65)
No. 56 Mk I	A.S. 100-lb. Mk VI
No. 57 Mk I	T.I. 1,000-lb. Mk I
No. 63 Mks I & II	Cluster Projectile No. 17 Mk II
No. 65 Mk I	Cluster Projectile No. 23 Mk I
No. 66 Mk I	Cluster Projectile No. 24 Mk I
No. 69 Mk I	Cluster Projectile No. 1 Mk I
No. 70 Mk I	Cluster Projectile No. 2 Mk I
No. 75 Mks I & II	T.I. 250-lb. Nos. 1–28
No. 78 Mk I	D.P. 12,000-lb. Mk I
No. 79 Mk I	I.B. 400-lb. Mk. I
No. 81 Mk I	Smoke 500-lb. Mk II
No. 82 Mk I	D.P. 22,000-lb. Mk I

Color Markings and Stencilling of British Bombs

The following list gives the color markings employed on loaded British bombs.

Bomb Type	Color Markings
F.	Dark green over-all with red band forward of light green band on nose
G.P.	Dark green over-all with red nose band, and light green body band
M.C.	Dark green over-all with red nose band, and light green band on base of ogive
H.C.	Dark green over-all with red nose band, and light green band on forward portion
S.A.P.	Dark green over-all with a white band just forward of a red band on the nose
A.P.	Dark green over-all with nose painted light green to point of greatest diameter; white band between two red bands on nose
D.P.	Dark green over-all with red band near nose
A.S.	Dark green over-all with red nose band and light green band at base of ogive
D.C.	Dark green over-all with red nose band, and colored band indicating filling forward of the suspension lug
B.	Dark green over-all with red nose band and green band on ogive
I.B.	Either dull red over-all, or have red nose end. Most small sizes have a bright red band between two black bands around the nose. Large sizes have a bright red band on the body and another on the after body.
Smoke	Dark green over-all with a red band either around the nose, or the after part of the body
L.C.	Grey over-all with colored bands to indicate chemical filler; black band, teargas; green band, lung irritant; yellow band, vesicant
Practice	White over-all with two green bands around the tail cone

Figure 1—Typical bomb markings

Bomb Type	Color Markings
I.T.	Dark green over-all with red and green bands on nose
T.I.	Black over-all with red band at base of ogive. Color of band around nose plug indicates color of candles. A red cross on the after part of the body indicates that explosive candles are used.
Flares and Photoflash	Black over-all with red band near nose
Cluster Projectiles	Painted an over-all color according to the type of small bombs carried

H.E. filled bombs were originally painted yellow by the British. The change to dark green was made at about the same time that the United States changed to olive drab. Consequently, yellow painted bombs may still be found.

Complete information, including weight, type, mark number, filling, date filled, filling station and lot number will be found stencilled on the outside of all British bombs. Although the location of the various stencillings differs with different bombs, the following sketch will indicate the information to be found and its approximate location on the outside of the bomb body.

Part I—Chapter 2

FRAGMENTATION BOMBS

Introduction

There are only two sizes of fragmentation bombs now in use by the British. These are the 8-lb., and several different marks of 20-lb. fragmentation bombs, including a modified U.S. 20-lb. fragmentation bomb.

The 20-lb. F. bomb is nose fuzed only, and is similar in construction to the 40-lb. G.P. bomb. It may be fitted with a standard tail for purposes of stabilization, or either a standard parachute attachment, or a special small parachute for use with the 500-lb. Cluster Projectile No. 17 Mk II may be used. The parachute attachments are designed to reduce the bomb's terminal velocity and so insure detonation of the bomb on impact before ground penetration takes place.

Fragmentation bombs are generally painted dark green over-all with a red band and a light green band around the nose end.

These fragmentation bombs are used principally against personnel.

F. 8-lb. Mk I (Obsolete), and Mk II (Service)

Data

Fuzing.....Tail Fuze No. 880 or 881
Color markings.....Dark green over-all; ¼-in. red band around after part, and ½-in. light green band around center of bomb
Parachute No.....Tray No. 12, Mk I, with parachute
Over-all length .....4.2 in.
Body length .....3.02 in.
Body diameter .....5 in.
Wall thickness .....0.125 in.
Total weight .....8 lb. approx.
Charge/weight ratio .....22% approx.

Body Construction: The bomb body consists of a pot-shaped, cast-steel cylinder which is open at the top. A steel neck ring, having internal threads to receive the adapter, is welded to the open end of the body. The parachute tray is secured to the adapter. Extending through the adapter is the fuze, which is enclosed by a paper tube 2-in. in diameter, extending through the bomb body.

Parachute: The parachute is 12 in. in diameter and is encased in a cylindrical steel tray having a diameter slightly less than the maximum diameter of the bomb body. A safety pin extends through the parachute container, and is secured by a spring clip.

Explosive Components: Main Filling — 1¾ lb. (approx.) or TNT, or RDX/TNT 60/40; 1½ lb. (approx.) of Amatol 50/50 or 60/40, or Pentolite/D 1. (When filled with explosives other than TNT, a ¼-in. topping of TNT is added.)

Remarks: The Mk I Bomb had a smaller filling hole than the Mk II. The Mk I was never filled or adopted for service use.

F. 20-lb., Stabilized, Mks I and II (Obsolescent), Mk III (Service), and Mk IV (Obsolescent)

Data

Fuzing....Nose Pistol No. 29, 34, 38, or 45; Nose Fuze No. 873
Color markings.....Dark green over-all; ½-in. red band around nose; 1-in. light green band 4 in. from nose
Over-all length .....21.8 in.
Body length .....11.9 in.
Body diameter .....3.95 in.
Wall thickness .....0.35 in.
Tail length .....9 in.
Tail width .....3.83 in.
Total weight ....20 lb. (approx. with pistol)
Charge/weight ratio 15%

Body Construction: This bomb has a streamlined, one-piece, cast-steel body, with the nose end open to take the exploder container. The rear end is reduced to form a spigot for taking

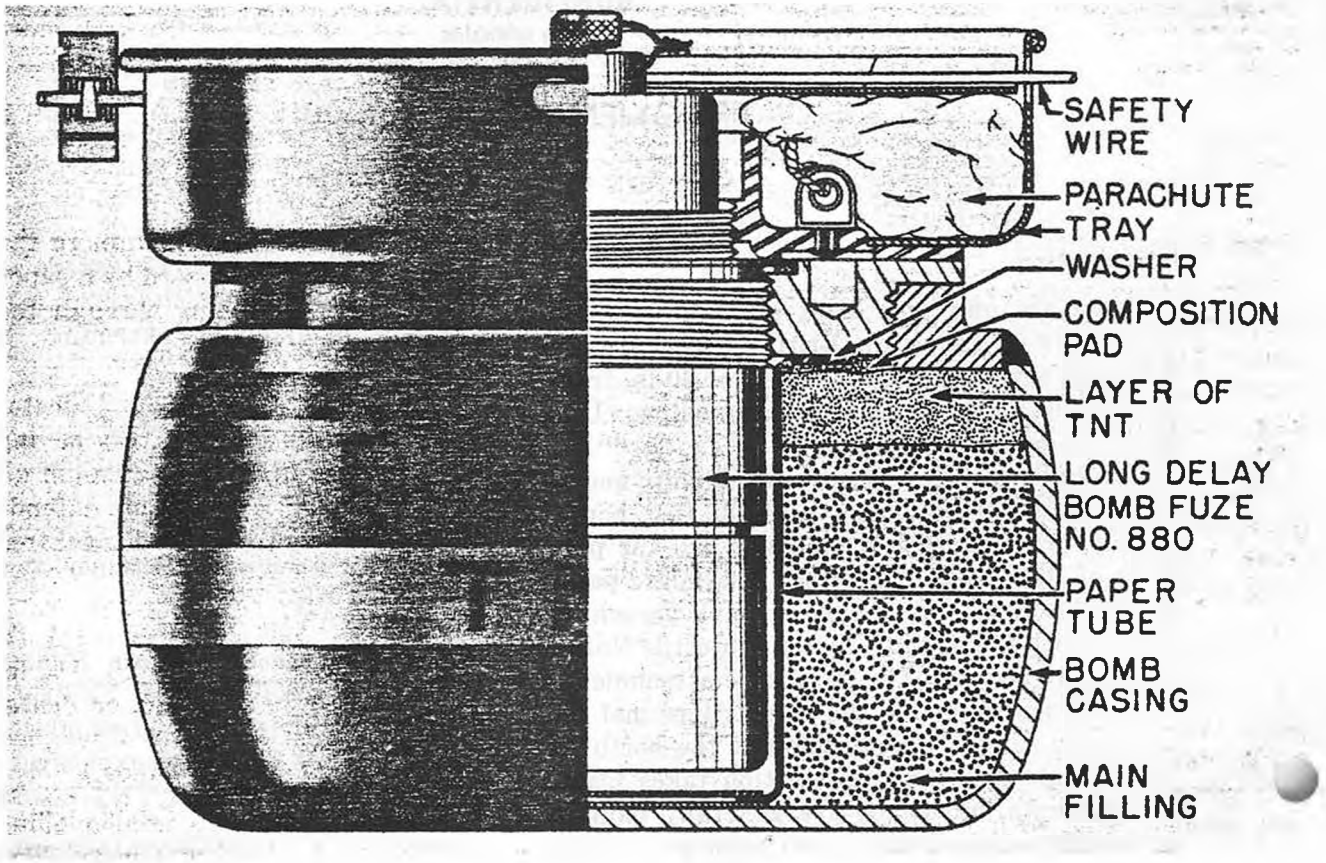

Figure 2—F. 8-lb. Bomb Mk II

the tail assembly. The boss on the spigot is tapped and threaded to receive the tail-securing rod. The exploder container is cemented in position, and locked by a locking screw.

Tail Construction: A cylindrical strut is attached to the tail cone by four fins. The tail is secured to the body by a tail rod screwed into a boss on the body spigot, and passing through a threaded adapter on the narrow end of the tail cone. The locking nut and spring washer at both the outer and inner ends of the rod lock it in position.

Suspension

Mk I—Carried 12 in Small Bomb Containers, or on Light Series bomb carrier if fitted with a suspension lug.

Mk II—Carried 12 in Small Bomb Containers, or on Light Series bomb carrier if fitted with suspension lug or band.

Mk III—Suspension lug welded on bomb body at center of gravity for carrying on Light Series bomb carrier; can be carried 12 in Small Bomb Container.

Explosive Components

Detonators—(See Part 2, chap. 4, Detonators.)

Exploders—C. E. and TNT pellets (C.E. only being used now).

Filling—3.3 lb. TNT or RDX/TNT. (When RDX/TNT is used, a ¼-in. to ⅜-in. topping of TNT is used in the nose.)

Remarks: The Small Bomb Container, 160 lb., contains eight of these bombs. The Small Bomb Container, 250 lb., will hold 12 of these bombs. These bombs are no longer being manufactured. However, they may be encountered in the field. They are being replaced by the 8-lb.-fragmentation bomb.

In the Mk IV Bomb the exploder system was changed to use only C.E. pellets, and a special retarder tail was incorporated.

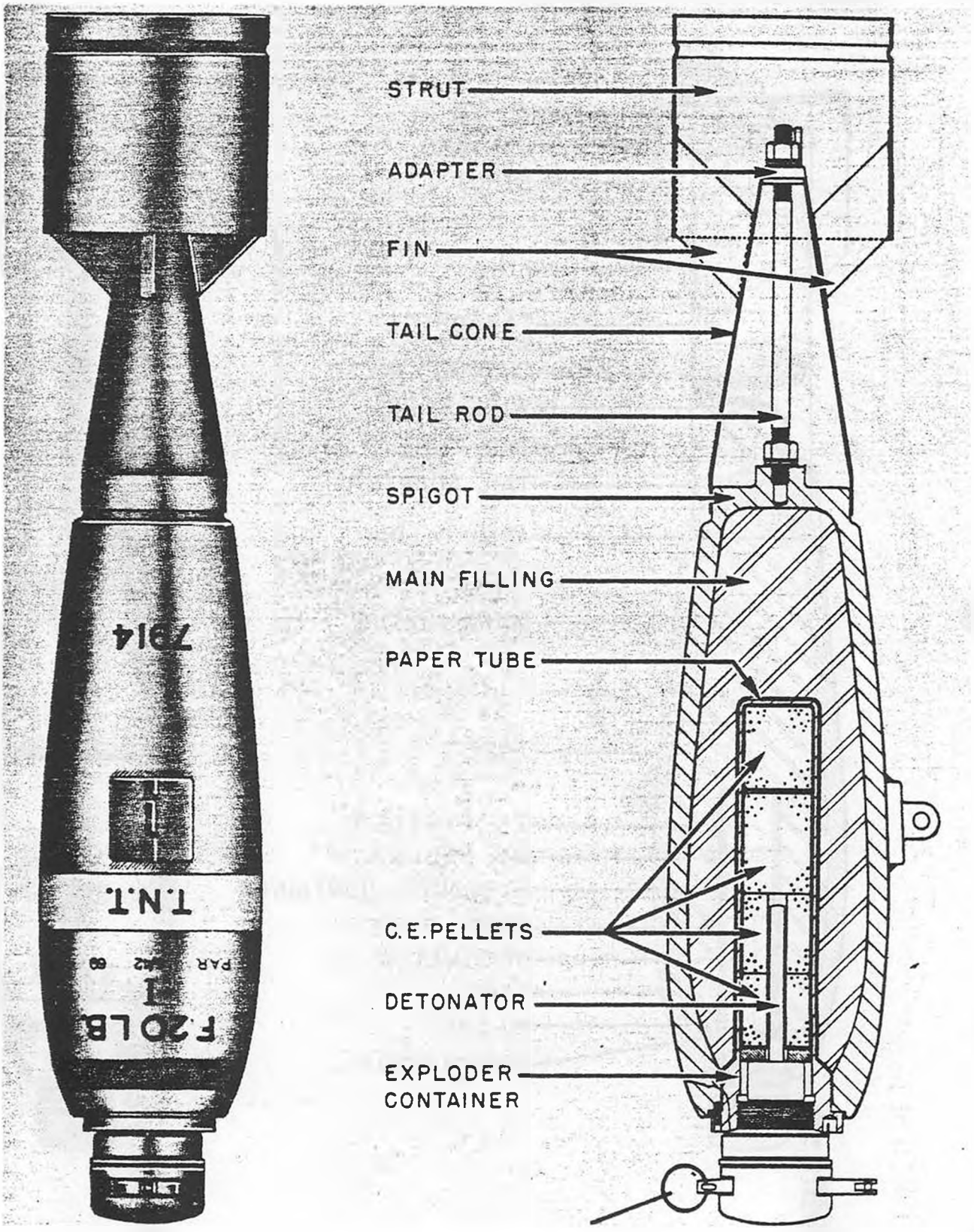

Figure 3—F. 20-lb. Bomb Mk I (Stabilized)

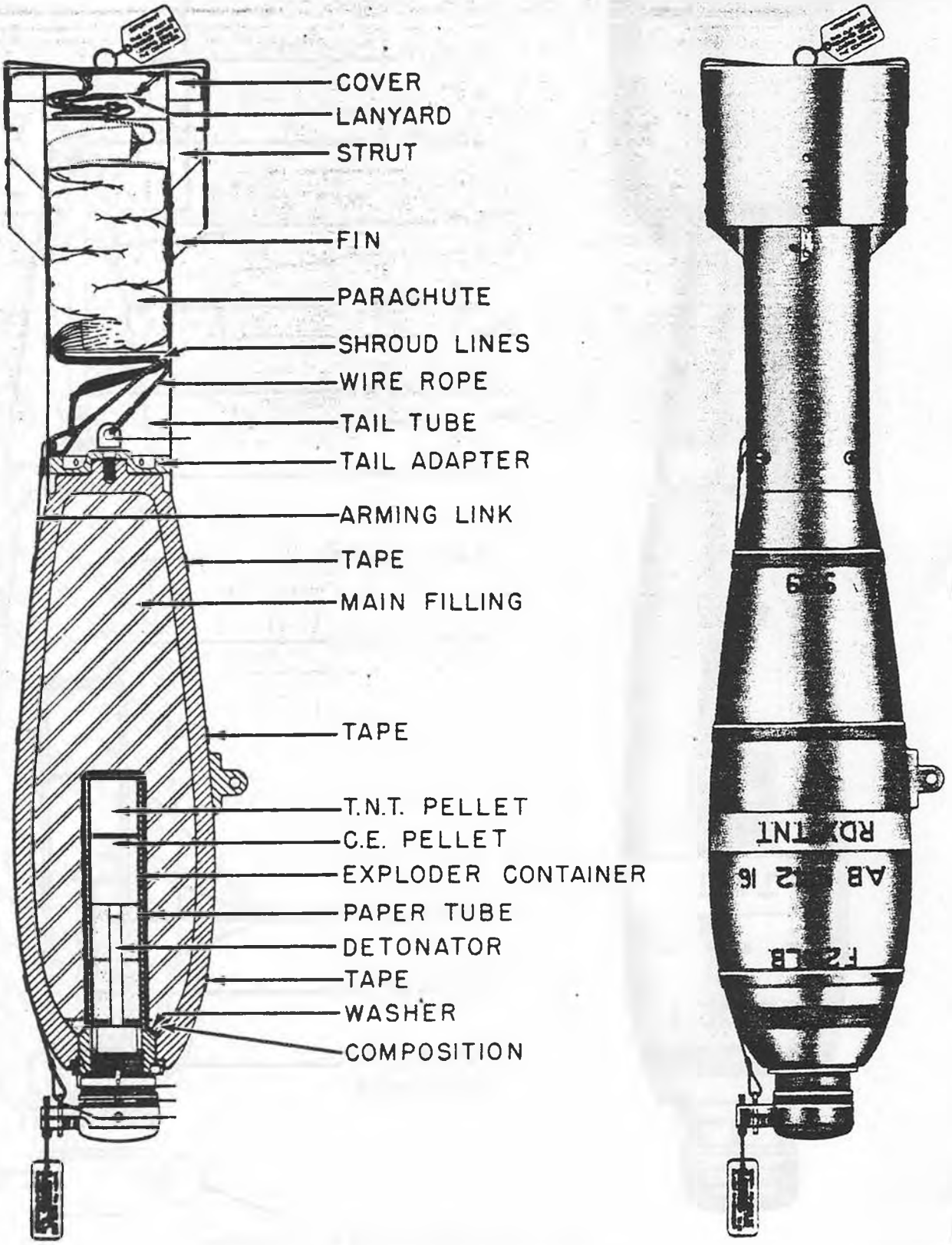

Figure 4—F. 20-lb. Bomb Mk III (Parachute)

F. 20-lb., Parachute, Mks I and II (Obsolescent), and Mk III (Service)

Data

Fuzing.....Nose Pistol No. 33
Color markings.....Dark green over-all; ½-in. red band around body ½ in. from nose; 1-in. light green band 4 in. from nose
Over-all length .....21.8 in.
Body length .....11.9 in.
Body diameter .....3.95 in.
Wall thickness .....0.35 in.
Tail length .....10 in.
Tail width .....3.9 in.
Total weight .....20 lb. (approx.)
Charge/weight ratio 15%

Body Construction: This bomb has a streamlined, one-piece, cast-steel body, with the nose end open to take an exploder container. The rear end is reduced to form a spigot for taking the tail adapter. The boss on the spigot is tapped and threaded to receive the tail adapter securing bolt. The exploder container is cemented in position and locked by a locking screw.

Tail Construction: The parachute tail unit consists of a tail tube with a cylindrical strut connected to its rear portion by four fins. The parachute, which is housed in a fabric cylinder, is contained in tail tube. A loose-fitting metal cover in the after end of the tube is attached to the fabric cylinder. The parachute cords are connected to a wire rope secured to an eyebolt which connects the tail adapter and the body. The tail adapter is secured in the front end of the tail tube by four screws. When dropped, the metal end cover in the tube is blown off by the air slip, and acts as a pilot parachute to pull the main parachute out of the tube.

Suspension

Mk I—Carried 12 in Small Bomb Containers, or on Light Series bomb carrier if fitted with suspension lug.
Mk II—Carried 12 in Small Bomb Containers, or on Light Series bomb carrier if fitted with suspension band.
Mk III—Suspension lug welded on bomb body at center of gravity for carrying on Light Series bomb carrier; can be carried 12 in Small Bomb Container.

Explosive Components

Detonators—(See Part 2, chap. 4, Detonators.)
Exploder—C.E. and TNT pellets.
Filling—Mk III, 3 lb. (approx.) RDX/TNT; Mk I and Mk II, 3.3 lb. TNT.

Remarks: The Small Bomb Container, 160 lb., contains eight of these bombs. The Small Bomb Container, 250 lb., contains 12 of these bombs. These bombs are no longer being manufactured. However, they may be encountered in the field. They are being replaced by the 8-lb. fragmentation bombs.

F. 20-lb., For No. 17 Mk II Cluster Only (Service)

Data

Fuzing.....Nose Fuze No. 873
Color markings.....Dark green over-all; ½-in. red band around nose; 1-in. light green band around body
Tail No.....No. 15 Mk I, or No. 16 Mk I parachute attachments
Over-all length .....14.5 in.
Body length .....11.9 in.
Body diameter .....3.9 in.
Wall thickness .....0.35 in.
Total weight .....20 lb. (approx.)
Charge/weight ratio 15%

Body Construction: This bomb has a streamlined, one-piece, cast-steel body, with the nose end open to take an exploder container. The rear end is reduced to form a spigot for taking the parachute attachment. The spigot is tapped and threaded to receive the securing stud of the parachute attachment. The exploder container is cemented and locked in position. The No. 873 Nose Fuze is locked in position by a multi-tab washer.

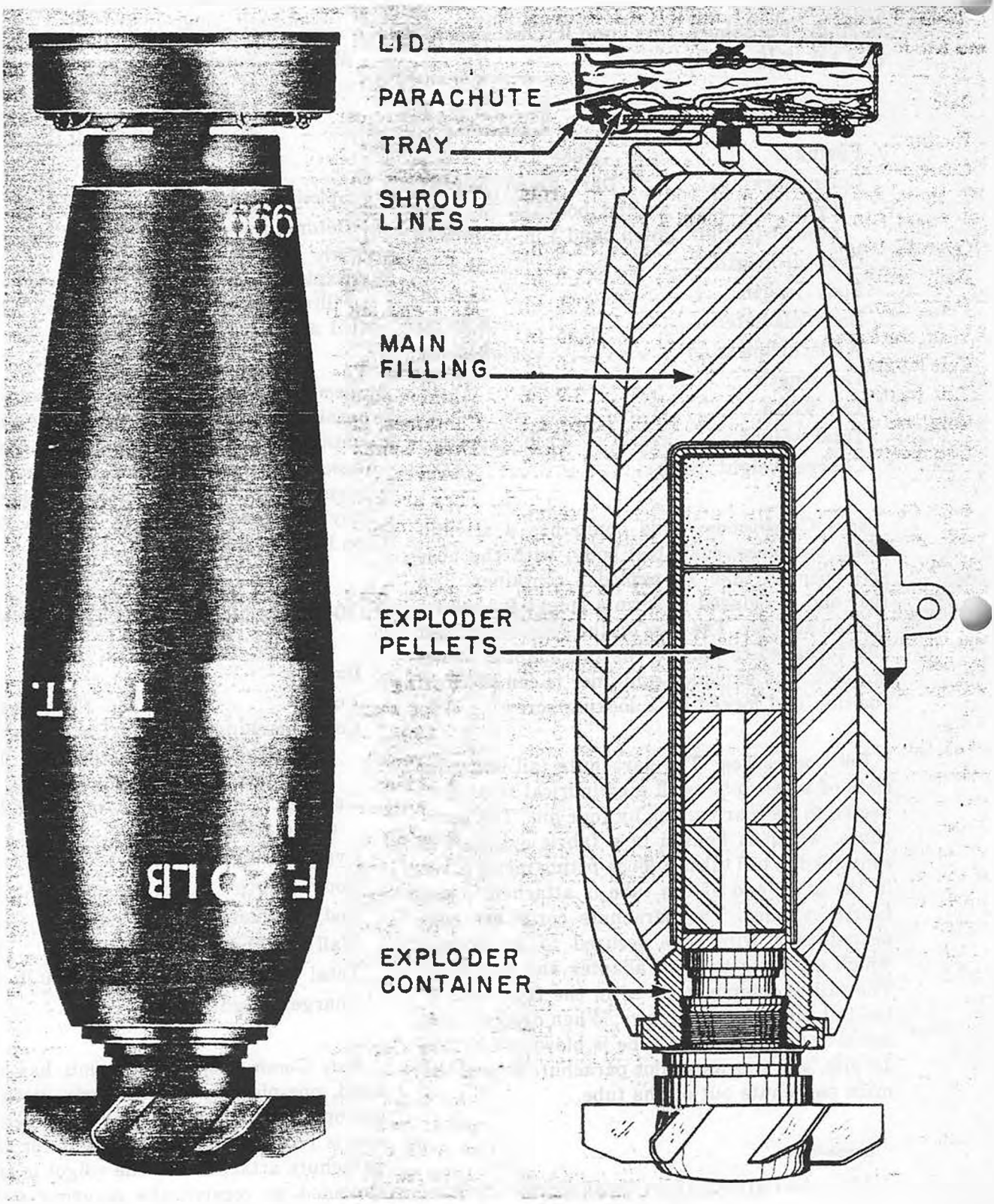

Figure 5—F. 20-lb. Bomb Mk II (for No. 17 Cluster only)

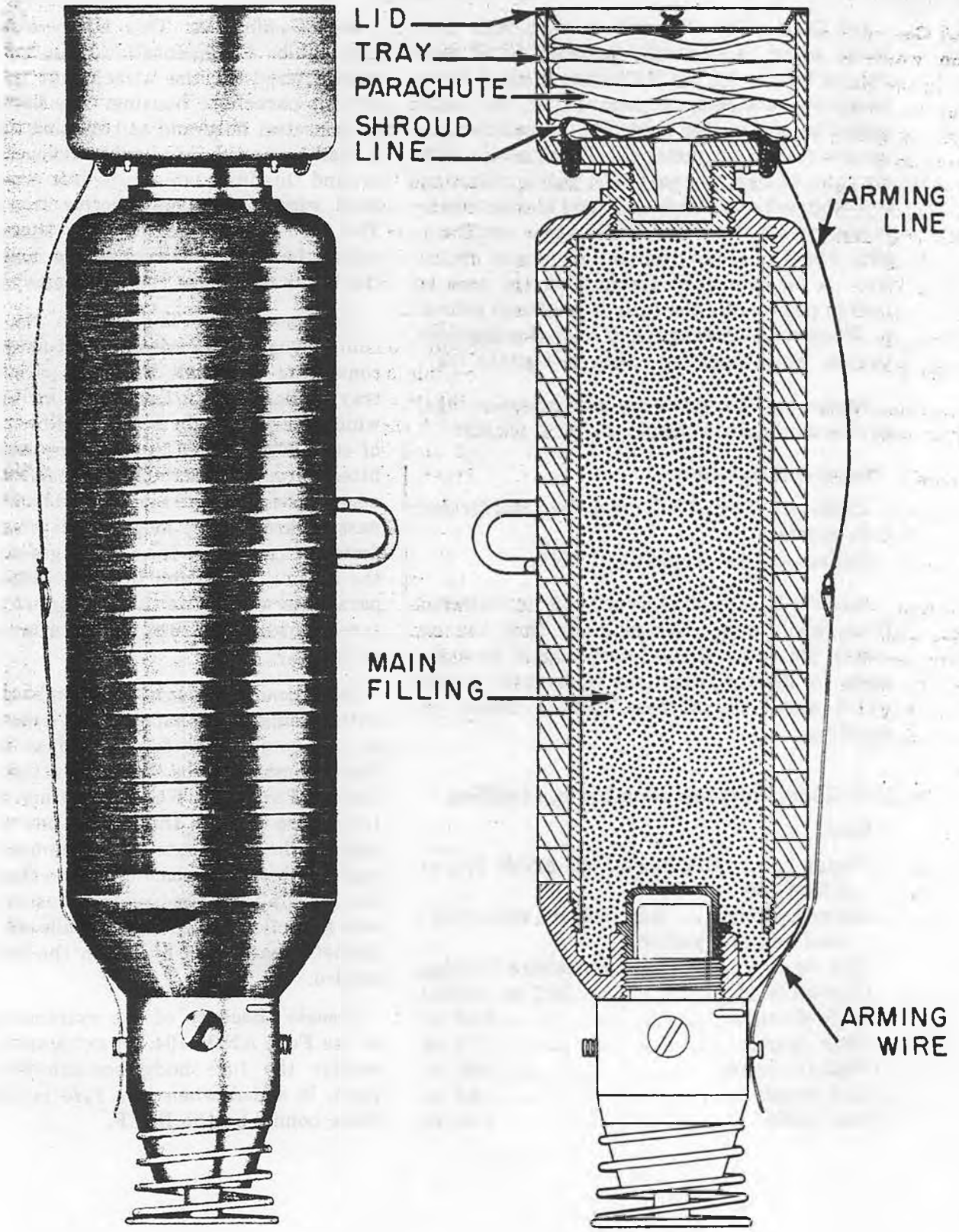

Figure 6—U. S. 20-lb. Fragmentation Bomb, Modified

Tail Construction: No tail is used with this bomb, which is especially designed to be used only in the No. 17 Mk II Cluster. It has a short parachute attachment, secured to the body spigot by a threaded stud. The parachute tray houses an 8-in. diameter fabric parachute with six pairs of rigging lines; each pair terminating in a whipped eye. These eyes pass through holes in the tray and are threaded onto a metal circlip, which is secured on the underside of the tray. A lid over the parachute in the tray is held in position by the fuze of the bomb behind it. When the cluster opens, the air slip displaces the lid, which pulls the chute free of the tray.

Suspension: This bomb has no suspension lugs, as it is used only in the No. 17 Mk II Cluster.

Explosive Components

Exploder—Two TNT, and two perforated C.E. pellets.

Filling—3.1 lb. (approx.) of TNT.

Remarks: The bomb is issued only in clustered form, and, when clustered, the fuze has no safety pin fitted. Hence, care should be exercised in dealing with any individual bombs which might break loose from a cluster in handling.

U. S. 20-lb. Fragmentation Bomb, Modified

Data

Fuzing.....U.S. Nose Fuze AN-M 104, or AN-M 120
Color markings....Body section, olive drab; nose and tail, yellow
Tail No.....No. 14 Parachute Housing
Over-all length.....16.2 in. (fuzed)
Body diameter .....3.64 in.
Body length .....11.3 in.
Wall thickness .....0.56 in.
Tail length .....4.9 in.
Tail width .....3.64 in.

Body Construction: This bomb consists of a U.S. 20-lb. Fragmentation Bomb, which has been altered by the attachment of a special British parachute housing. The bomb consists of cast-steel nose and tail sections threaded to a seamless steel inner tube. Helically wrapped around this inner steel tube is a heavy, drawn-steel wire to provide effective fragmentation. The nose and tail sections are threaded internally; the former to receive the nose fuze, and the latter to receive the parachute housing.

Tail Construction: The British No. 14 Parachute Housing consists of a cast-aluminum tray containing a 12-in. diameter parachute. The tray is closed by a loosely fitting metal lid to which the parachute is attached by a short loop of cord. The shroud lines of the parachute are fitted through holes drilled around the bottom edge of the tray, and are secured by a metal ring passed through the loops of the lines. Leading from the parachute is an arming line, spliced to the arming wire from the fuze. Release of the parachute withdraws the arming wire from the fuze, allowing the fuze to arm after a few seconds delay.

Suspension: Although the bomb is provided with a single, U-shaped, steel eyebolt welded to the bomb body for individual suspension, these bombs will be carried by the R.A.F. in Cluster Projectiles No. 23 Mk I and No. 24 Mk I. In these clusters the nose of one bomb bears against the parachute lid of the one behind it, holding the lid in place until the cluster opens. The air slip then removes the housing lid, which acts as a pilot parachute and pulls out the 12-in. diameter parachute by which the bomb is suspended.

Remarks: Because of the extreme sensitivity of the Fuze AN-M 104, an extra spring, located outside the fuze body beneath the pressure plate, is added when this fuze is employed in these bombs by the R.A.F.

Part I—Chapter 3

GENERAL PURPOSE BOMBS

Introduction

General Purpose bombs are heavy-cased bombs ranging in weight from 40 lb. to 4,000 lb. The smaller bombs are used mainly as anti-personnel bombs, while the larger ones are used for general bombardment purposes.

The earlier marks of these bombs are fitted with central tubes to take the explodering components, but later marks are fitted with exploder containers at the nose end, or at the nose and tail ends. Bombs with central tubes or with exploder containers at each end may be fuzed at both ends, or at either end, depending on the operational requirements. Bombs fuzed at the nose only are fitted with instantaneous detonators, while bombs fuzed at the tail are usually fitted with delay detonators. If bombs are fuzed at both the nose and the tail with instantaneous detonators, the nose assembly will function first, on account of the direct action of the nose pistol. The general practice is to ship G.P bombs with a tail pistol in place, but without detonators, altering the fuzing as may be desired prior to loading the bombs on the plane.

G.P. bombs are generally streamlined in shape, cast in one piece, and have a male base plate. To facilitate handling in storage and shipment, the bombs have a transit base of the same diameter as the maximum diameter of the bomb. Before using, bombs under 1,000 lb. are equipped with a tail unit that clips in place. Bombs of 1,000 lb. and over employ a tail unit which is secured by wing bolts.

TNT, Amatol, and RDX/TNT are the explosives commonly employed as main fillings to give a charge/weight ratio of approximately thirty per cent.

G.P. bombs are painted dark green over-all and have a ½-in. red band at the nose, and a 1-in. light green band on which the type of filling is stencilled.

G.P. 40-lb., Stabilized, Mks I, II, III (Service), and Mk IV (Obsolescent)

Data

Fuzing....Nose Pistol No. 29, 34, 38, or 45; Nose Fuze No. 873
Color markings.....Dark green over-all; ½-in. red band 1 in. from nose; 1-in. light green band 5½ in. from nose
Over-all length .....27.25 in.
Body length .....15.90 in.
Body diameter....Mk I, 5.01 in.; Mks II and III, 5.05 in.
Wall thickness .....0.47 in.
Tail length .....11.4 in.
Tail width .....4.88 in.
Total weight.....38.5 lb. (Mk III)
Charge/weight ratio 17%

Body Construction: The bomb body is made of cast steel. The open hose end is threaded internally to receive an exploder container, which is screwed and cemented in position and locked by a set-screw. The rear end of the bomb is closed and reduced in diameter to form a spigot. A boss on the spigot is drilled and tapped to receive the forward threaded end of a tail rod. The exploder container is in the form of a tube closed at one end, the open end of which is threaded internally to take the pistol.

Tail Construction: A cylindical strut is attached to a tail cone by four fins. The tail unit is secured to the body by a tail rod which extends axially through the tail cone. The forward end of the rod, which screws into the central boss on the spigot at the rear of the bomb body, is locked by a spring washer and a lock-nut. The rear end of tail cone is fitted with an internally threaded flanged adapter, which screws on the threaded rear end of tail rod, correctly locating the tail cone on the bomb body. The tail is locked in position by a spring washer and lock-nut screwed against the adapter.

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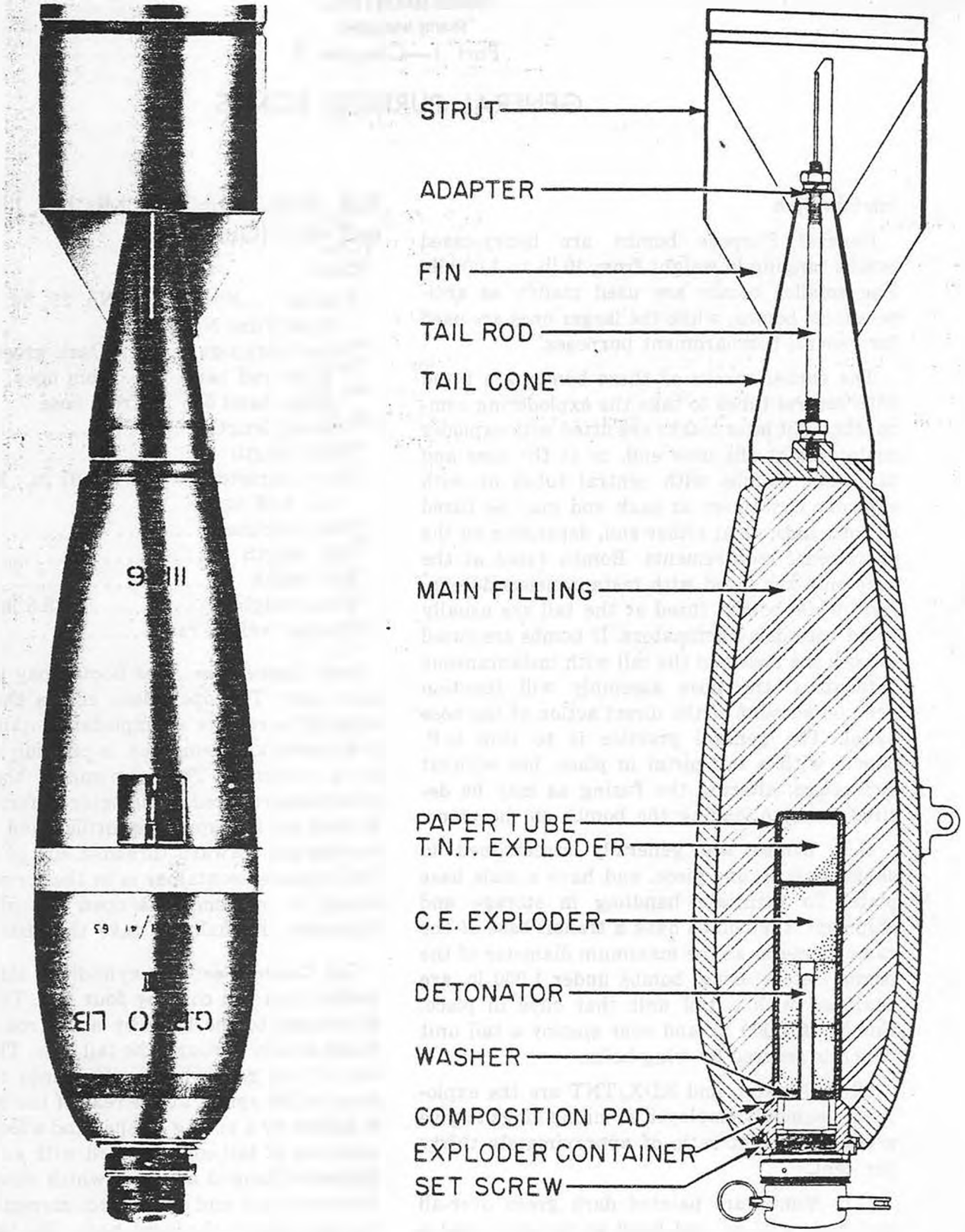

Figure 7—G.P. 40-lb. Bomb Mk III (Stabilized)

Suspension

Mk I—Normally carried 6 in the 250-lb. Small Bomb Container, although a limited number have a single suspension lug.

Mk II—Normally carried 6 in the 250-lb. Small Bomb Container; may be fitted with a suspension band.

Mk III—Has a suspension lug, and may be carried 6 in the 250-lb. Small Bomb Container, or on Light Series bomb carriers.

Explosive Components

Detonators—(See Part 2, chap. 4, Detonators.)

Exploders—TNT (1 oz. 7 dr.) and C.E. (4 oz. 6 dr.) retained by a waxed felt washer.

Filling—Mk I, 6.3 lb. Amatol 80/20; Mk II, 6.5 lb. TNT, or 6.7 lb. RDX/TNT 60/40; Mk III, 6.5 lb. Amatol 60/40, or 6.7 lb. of RDX/TNT 60/40.

Remarks: This bomb is usually used as a fragmentation bomb, being almost identical to the 20-lb. fragmentation bomb except for size.

The exploder system of the Bomb Mk IV was changed to use only C.E. pellets, and a special retarder tail was incorporated.

G. P. 40-lb., Parachute, Mks I, II, and III (Service)

Data

Fuzing.....Nose Pistol No. 33 Mk I
Color markings.....Dark green over-all; ½-in. red band 1 in. from nose; 1-in. light green band 5½ in. from nose
Over-all length .....27.25 in.
Body length .....15.90 in.
Body diameter....Mk I, 5.01 in., Mks II and III, 5.05 in.
Wall thickness .....0.47 in.
Tail length .....11.4 in.
Tail width .....4.88 in.
Total weight .....38.5 lb.
Charge/weight ratio 17%

Body Construction: This bomb has a cast-steel body, the nose end of which is fitted with an exploder container screwed and cemented in position, and locked by a locking screw. The exploder container is threaded to take the pistol. The rear end of bomb body is closed and reduced in diameter to form a spigot with a central boss, which is drilled and tapped to receive an eyebolt. The parachute tail unit is secured to the body by means of the eyebolt.

Tail Construction: The parachute tail unit consists of a cylindrical strut attached to the rear end of a tail tube by four fins. The parachute is packed in a fabric cylinder, which is closed at its rear end and fits inside the tail tube. The rear end of the fabric cylinder is connected by pilot lanyards to a flanged cover which fits loosely in the cylindrical strut and is retained in position to close the rear end of the tube by means of a wire transit clip.

Suspension

Mk I—Normally carried 6 in the 250-lb. Small Bomb Container, although limited numbers have a single lug.

Mk II—Normally carried 6 in the 250-lb. Small Bomb Container, but may be suspended by a band around the body.

Mk III—A single lug is welded to the body for use when carrying on the Light Series bomb carrier. Can be loaded 6 into 250-lb. Small Bomb Container.

Explosive Components

Detonator—(See Part 2, chap. 4, Detonators.)

Exploder—TNT and C.E. retained by a waxed felt washer.

Filling—Mk I, 6.3 lb. Amatol 80/20; Mk II, 6.5 lb. TNT; Mk III, 6.5 lb. Amatol 60/40.

Remarks: This bomb is usually used as fragmentation bomb, and is identical to the 20-lb. parachute fragmentation bomb except for size.

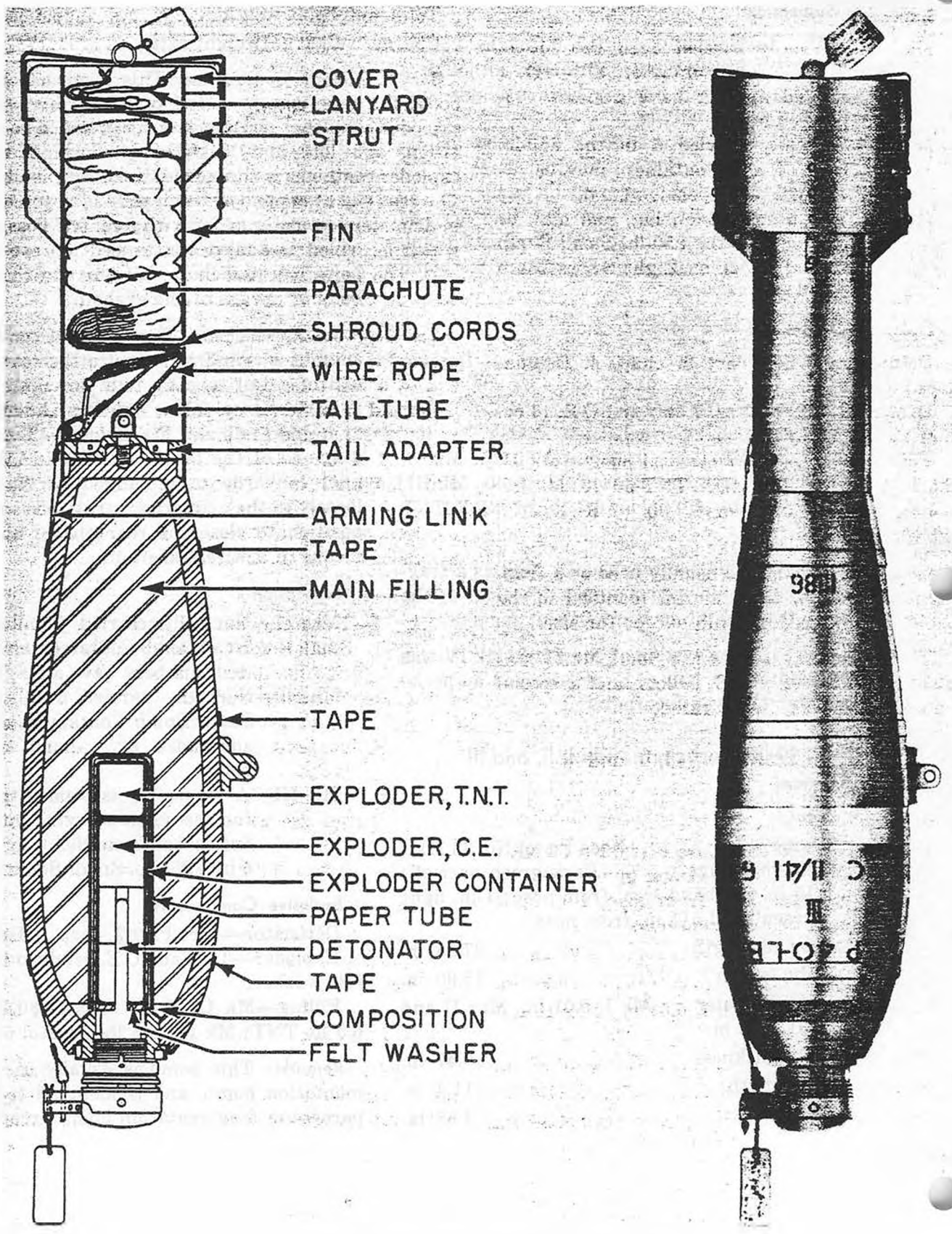

Figure 8—G.P. 40-lb. Bomb Mk III (Parachute)

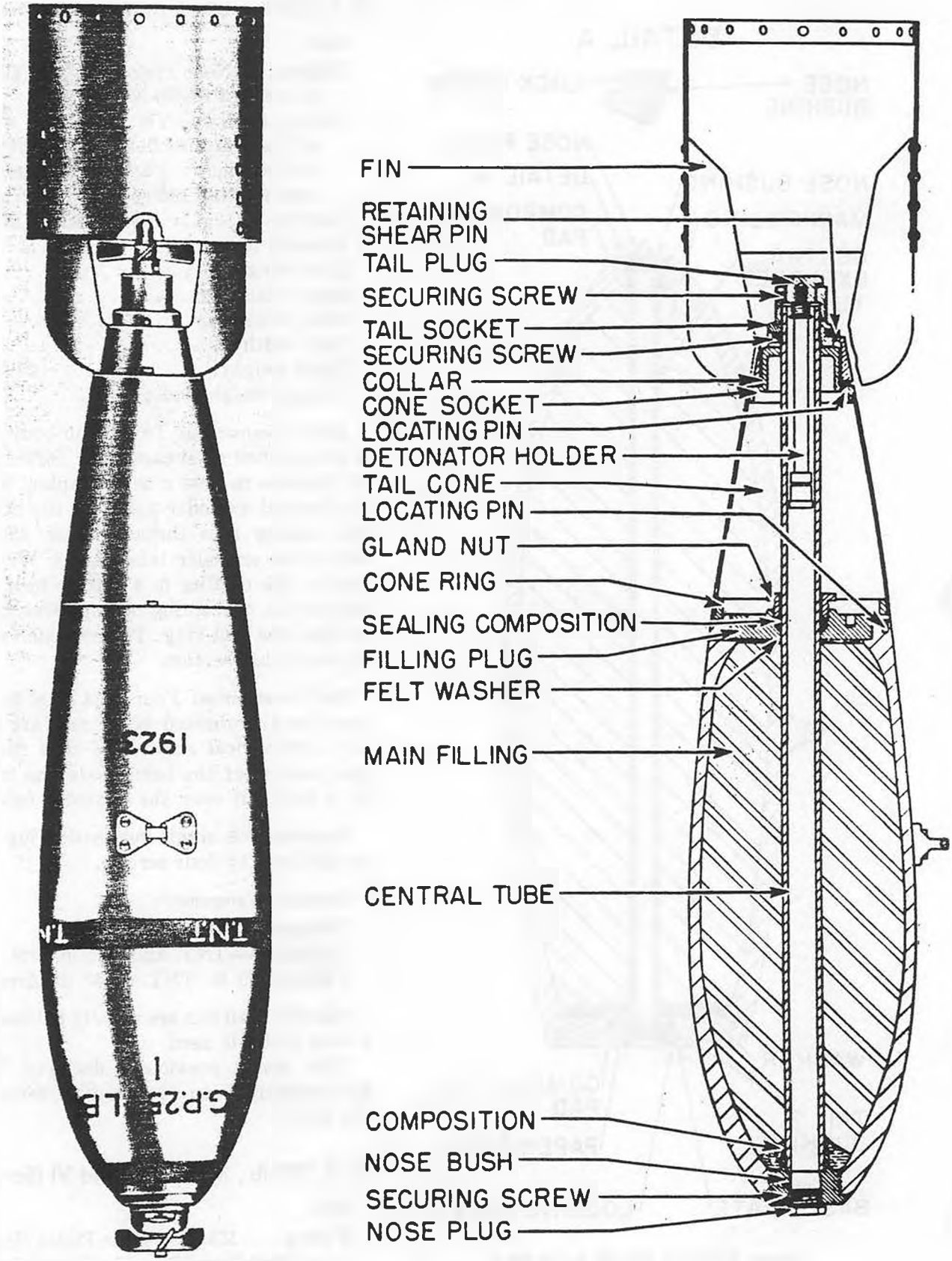

Figure 9—G.P. 250-lb. Bomb Mk I

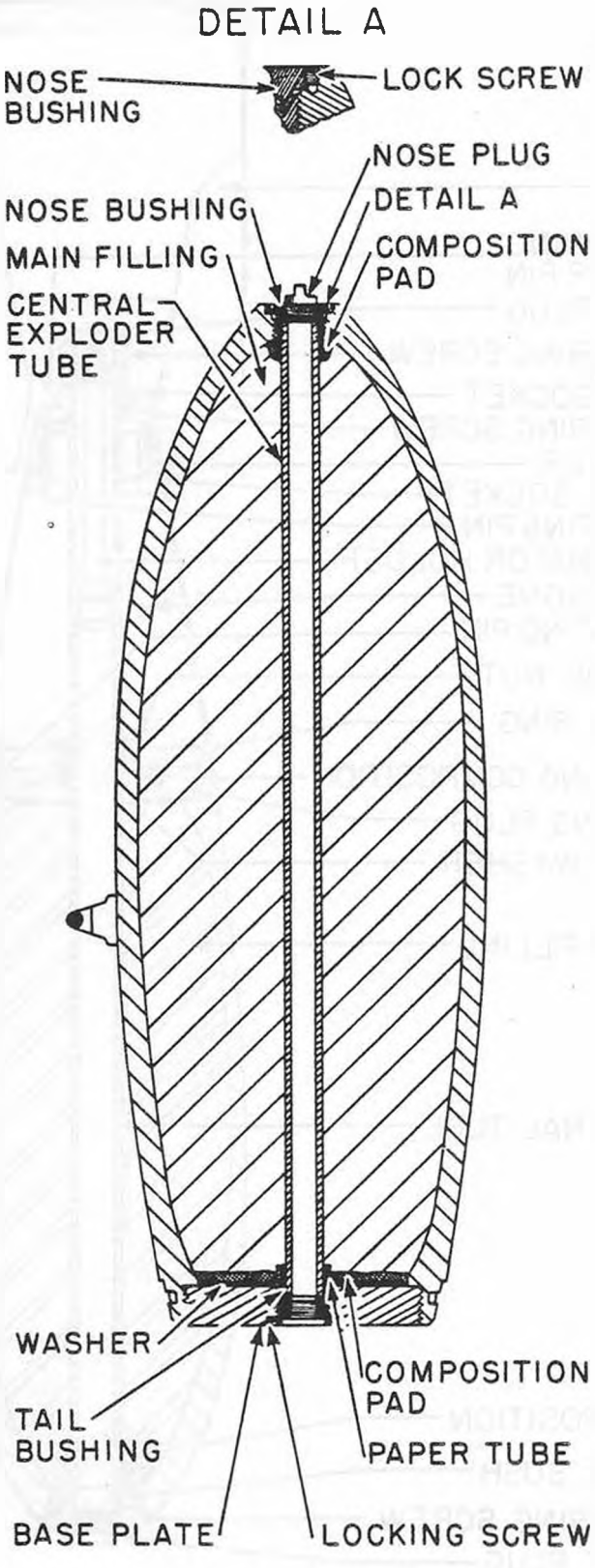

Figure 10—G.P. 250-lb. Bomb Mk V

G.P. 250-lb., Mks I, II, and III (Service)

Data

Fuzing....Nose Pistol No. 19; Tail Pistol No. 22, or Tail Pistol No. 17
Color markings..Yellow over-all with a ½-in. red band around nose, 1-in. light green band around body; longitudinal green bar on body and tail indicates explodering scheme.
Tail No.....No. 1 Mk I (Mk III only)
Over-all length .....54.2 in.
Body length .....28 in.
Body diameter .....10.3 in.
Wall thickness .....0.6 in.
Tail width .....10.2 in.
Total weight.....247 lb. (TNT)
Charge/weight ratio 27%

Body Construction: This bomb body consists of a streamlined steel casting or forging threaded at the nose to take a nose adapter, which holds the central exploder tube. At the other end of the casting is a threaded base plug through which the exploder tube passes. Welded to the end of the casting is a streamlined section of thin metal, containing no explosive, but tapered to take the tail ring. The exploder also passes through this section.

Tail Construction: Four mild steel fins are fastened to a truncated cone, and are reinforced by a cylindrical strut. The cone fits over the rear section of the bomb body and is held to it by a lock nut over the exploder tube.

Suspension: A single suspension lug is secured to the body by four screws.

Explosive Components

Detonators—Instantaneous.
Exploders—TNT, and C.E. pellets.
Filling—68 lb. TNT, or 63 lb. Amatol 80/20.

Remarks: Tail fins are usually painted red when a time pistol is used.

This bomb, previously declared "Obsolete," has recently been returned to service use by the R.A.F.

G. P. 250-lb., Mks IV, V, and VI (Service)

Data

Fuzing....Mk IV—Nose Pistol No. 27, 42, or 44; Tail Pistol No. 28, 30, or 37

Mk V—Tail pistol No. 17 (Long Delay) only
Mk VI—See "Remarks."
Color markings....Dark green over-all with ½-in. red band 1-in. from nose, and 1-in. light green band 6 in. from nose; 1-in. by ¼-in. white line on the body base indicates that bomb has been filled.
Tail No.....No. 2 Mk II (early Mk IV uses No. 2 Mk I).
Over-all length .....56.00 in.
Body length .....Mk IV—25.60 in.
Mk V—27.6 in.
Body diameter .....10.2 in.
Wall thickness .....0.52 in.
Tail length .....27.7 in.
Tail width .....10.2 in.
Total weight .....230 lb.
Charge/weight ratio 29%

Body Construction

Mk IV—The body consists of a hollow steel casting open at each end. The nose end is internally threaded to house the exploder container, which is locked in position by a locking screw. The tail end is shaped to take the tail cone, and is provided with four equally spaced supports, which locate the spring clips on the tail. A male base plate threads into the after end of the body and has two threaded holes to receive the transit base plate.

Mk V—The Mk V Bomb is the same externally as the Mk IV, but is fitted with a central exploder tube instead of the exploder containers at the nose and tail. This bomb does not take a nose pistol, but uses only the No. 17 Long Delay Pistol. The nose opening is filled by a nose plug.

Tail Construction: The No. 2 Mk I Sheet-Metal Tail is attached to the body by four spring clips. The tail consists of a tail cone with a cylindrical tail strut attached to it by four fins. The spring clips are fitted to the base of the cone, which is slotted to engage the locating pin on the bomb body. At the apex of the tail cone is fitted a bush, locating one end of the arming spindle, which is supported at the opposite end by a diaphragm at the base of the tail cone. The inner end of the arming spindle has an arming fork attached to it which engages the arming fork of the tail pistol of the bomb.

Suspension: The bomb has a single suspension lug secured to it by four countersunk screws.

Explosive Components

Detonators—(See Part 2, chap. 4, Detonators.)
Exploder—TNT and C.E.
Filling—67.75 lb. TNT, or 67 lb. Amatol 60/40.

Remarks: The Bomb Mk V was manufactured to use up existing stocks of the Pistol No. 17 (long delay), which is too long to fit in the Bomb Mk IV.

The No. 845 Anti-Disturbance Fuze, formerly incorporated in the nose when the Tail Pistol No. 37 was used, is now obsolete.

Tail fins are usually painted red when a time pistol is used.

The Bomb Mk VI is made in the U. S. and uses fuzes manufactured there to British designs: Nose Fuze Mk VII, M3, and Tail Fuze Mk V, M1.

G.P. 500-lb., Mks IV, V, and VI (Service)

Data

Fuzing....Mk IV—Nose Pistol No. 27, 42, or 44; Tail Pistol No. 28, 30, or 37
Mk V—Tail Pistol No. 17 (long delay) only
Mk VI—See "Remarks."
Color markings.....Dark green over-all; ½-in. red band 1 in. from nose; 1-in. light green band 8 in. from nose; 1-in. by ¼-in. white line on body base indicates bomb has been filled.
Tail No.....No. 2 Mk I, or No. 26 Mk I or II
Over-all length....With No. 2 Tail, 70.6 in.; with No. 26 Tail, 55.6 in.
Body length.....Mk IV—37.2 in.
Mk V—36.4 in.
Body diameter .....12.9 in.
Wall thickness .....0.72 in.
Tail length.....No. 2 Mk I, 33.4 in.; No. 26 Mk I, 20.4 in.
Tail width .....12.9 in.
Total weight .....470 lb. (with No. 2 tail)
Charge/weight ratio.....31% (approx.)

Body Construction

Mk IV—The body consists of a hollow steel casting open at each end. The nose end is internally threaded to house an exploder container, which is locked in position by a locking screw.

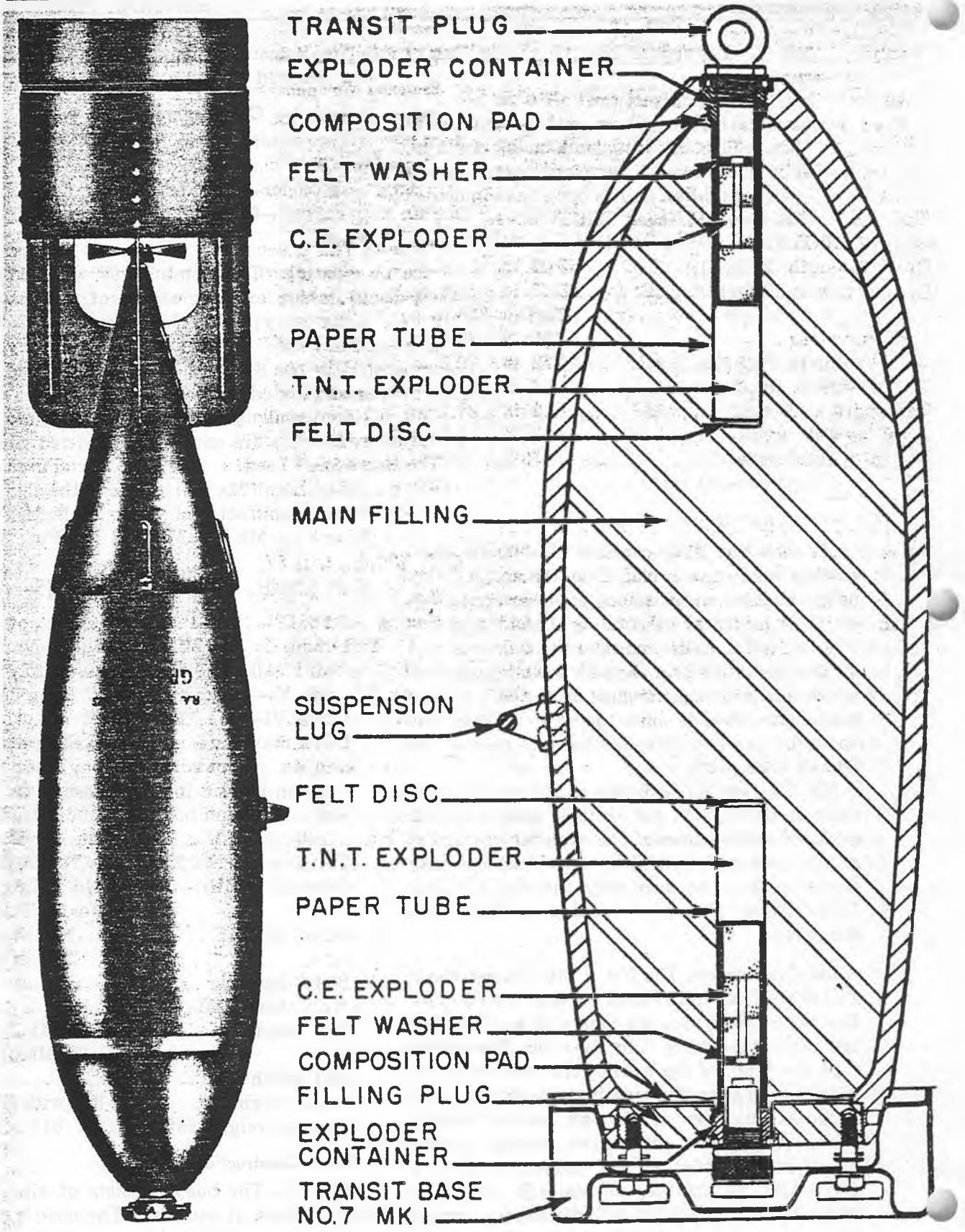

Figure 11—G.P. 500-lb. Bomb Mk IV

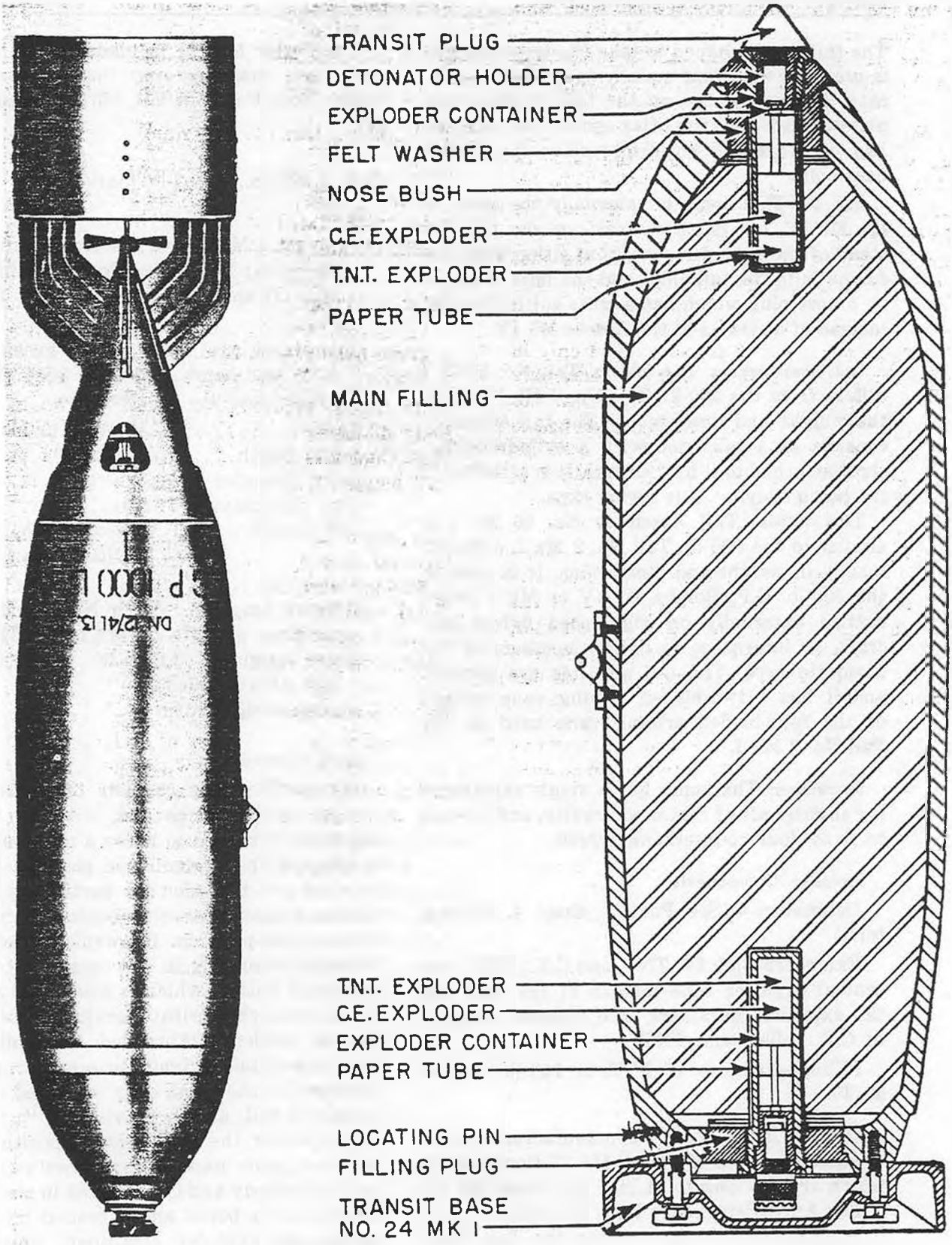

Figure 12—G.P. 1,000-lb. Bomb Mk I

The tail end is shaped to take the tail cone, and is provided with four equally spaced slots to locate the spring clips on the tail. A male base plate threads into the after end of the body and has two threaded holes to receive the transit base bolts.

Mk V—This bomb is externally the same as the Mk IV, but has a central exploder tube instead of the exploder pockets at either end. The fuzing is in the tail only, and the nose is closed by a nose plug which has a cross cut in the end, instead of a ring as in the Bombs Mk IV.

Tail Construction: The 500-lb. Tail No. 2 Mk I differs from the 250-lb. Tail No. 2 Mk I only in the weight and dimensions. The tail assembly consists of a tail cone with a cylindrical tail strut attached to it by four fins. It is attached to the bomb body by four spring clips.

The 500-lb. Tail Assembly No. 26 Mk I is similar to the 500-lb. Tail No. 2 Mk I, differing mainly in weight and dimensions. It is used on the 500-lb. G.P. Bombs Mk IV or Mk V when carried externally on high-speed fighter aircraft, or internally on fighter bombers of the Mosquito type. The tail and fins are shorter, and it has a two-bladed arming vane instead of the four-bladed arming vane used on the Tail No. 2 Mk I.

Suspension: The bomb has a single suspension lug slightly aft of center of gravity, and secured to it by four countersunk screws.

Explosive Components

Detonators—(See Part 2, chap. 4, Detonators.)

Exploders—Mk IV, TNT, and C.E.; Mk V, one central exploder tube instead of the nose and tail exploder containers. The exploder consists of C.E. pellets and TNT.

Filling—144.5 lb. of TNT, or 143 lb. Amatol 60/40.

Remarks: Bomb Mk V was manufactured to use up existing stocks of Pistols No. 17 (long delay), which are too long to fit into the Bomb Mk IV.

The Anti-Disturbance Fuze No. 845, formerly incorporated in the nose when the Tail Pistol No. 37 was used, is now obsolete.

Tail fins are usually painted red when a time pistol is used.

The Bomb Mk VI is made in the U.S. and uses fuzes manufactured there to British designs: Nose Fuze Mk VII, M3; Tail Fuze Mk V, M1.

G.P. 1,000-lb., Mks I-IV (Service)

Data

Fuzing....Mks I and II—Nose Pistol No. 27, 42, or 44; Tail Pistol No. 28, 30, or 37
Mks III and IV—Tail Pistol No. 28, 30, or 37

Color markings.....Dark green over-all; ½-in. red band 2 in. from nose; 2-in. light green band 9½ in. from nose

Tail No.....No. 13 Mk I, or No. 29 Mk I

Body length .....52.5 in.

Body diameter .....16.15 in.

Wall thickness .....0.77 in.

Tail length.....No. 13 Mk I, 35.5 in.; No. 29 Mk I, 20 in.

Tail width .....16 in.

Over-all length....With No. 13 Mk I Tail 86.5 in.; with No. 29 Mk I Tail, 71.0 in.

Total weight....1,072 lb. (with short tail and Amatol filled)

Charge/weight ratio 33%

Body Construction

Mk I—The body consists of a hollow steel casting open at each end, with the nose end internally threaded to house a nose bush, which is screwed and cemented in position. The bush is bored and threaded for part of its length to take an exploder container which is screwed and cemented in position. The exploder container is threaded internally in the open end to house a detonator holder, which is also cemented in position and locked with a locking screw. The detonator holder is threaded internally in the open end to take a pistol or a transit plug. The after end of the bomb body is shaped externally to take a tail, and is provided with a locating pin to locate the tail when in position on the bomb. A male base plate screws into the tail end of the body and is cemented in position. The filling plug is bored and threaded internally to receive an exploder container, which houses the detonator holder and is inserted and locked in the same manner as the one used in the nose of the bomb.

Mk II—Similar to the Mk I, except that the spigot on the tail end of the bomb body for locating the transit base and the seating on the bomb body for the suspension lug, are omitted.

Mk III—Similar to Mk I, except that the exploder containing and detonator holder are not fitted; the nose being plugged with a special adapter and transit plug which are welded in position.

Mk IV—Similar to Mk II body, except that the nose is permanently plugged in a manner similar to the Mk III.

Tail Construction

The No. 13 Mk I tail assembly consists of a tail cone, a cylindrical strut attached to the cone by four corrugated fins, and an arming mechanism for arming the tail pistol. A tail ring near the base of the tail cone is drilled to house four wing bolts used for attaching the tail to the bomb body. The arming mechanism consists of an arming spindle, one end of which is attached to the fork that engages the arming fork of the tail pistol.

No. 29 Mk I—Similar to the No. 13 Mk I, differing only in dimensions by having a shorter tail strut and fins. The fins are not corrugated. Arming vanes protrude beyond the cylindrical strut.

Suspension: The bomb has a single suspension lug 30 inches from nose plug tip, consisting of a rectangular stop plate to which is welded a lug. The plate is secured to the bomb body by two screws.

Explosive Components

Detonators—(See Part 2, chap. 4, Detonators.)

Exploders—TNT and C.E., with a wax-filled washer between the C.E. and the detonator holder.

Filling—357 lb. Amatol 60/40, or 378 lb. RDX/TNT 60/40. Each end of the bomb has the same sealing arrangement as the 1,900-lb. G.P.

Remarks: The Mks I and II may be fuzed nose or tail, or both. Mks III and IV are fuzed in the tail only. The Anti-Disturbance Fuze No. 845, formerly incorporated in the nose when the Tail Pistol No. 37 was used, is now obsolete.

The tail fins are usually painted red when a time pistol is used.

G.P. 1,900-lb. Mks I and II (Service)

Data

Fuzing....Nose Pistol No. 27, 42 or 44; Tail Pistol No. 28, 30, or 37
Color markings.....Dark green over-all; ½-in. red band 2 in. from nose; 2-in. light green band 11¼ in. from nose
Tail No. .....No. 14 Mk I
Over-all length .....98 in.
Body length .....63.2 in.
Body diameter .....18.7 in.
Wall thickness .....1.15 in.
Tail length .....35.3 in.
Tail width .....18.7 in.
Total weight .....1,785 lb.
Charge/weight ratio 26%

Body Construction

Mk I—The body consists of a hollow steel casting open at each end, with the nose end threaded internally to house a nose bush, which is screwed and cemented in position. The bush is bored centrally and threaded for part of its length to take an exploder container. The exploder container is locked to the nose bush by a locking screw, and is threaded internally at the open end to house a detonator holder, which takes a pistol or transit plug. The after end of the bomb body is shaped externally to take the tail, and provided with a locating pin to locate the tail when in position on the bomb. A male base plate screws into the base of the body and is cemented in position. It is bored and threaded internally to receive an exploder container, which houses a detonator holder in the same manner as that at the nose. A flat seating at the center of gravity is drilled and tapped to take four screws which secure a suspension lug.

Mk II—Similar to Mk I, except that the spigot on the tail end of the body for locating the transit base, and the seating on the bomb body for the suspension lug, are omitted.

Tail Construction: The No. 14 Mk I tail assembly consists of a tail cone, a cylindrical strut attached to the cone by four fins, and an arming mechanism for arming the tail pistol. The tail cone is secured to the body by a tail ring, which houses four wing bolts used to attach the tail to the body. Attached to the tail cone at the rear of the tail ring, is a spider in the form of

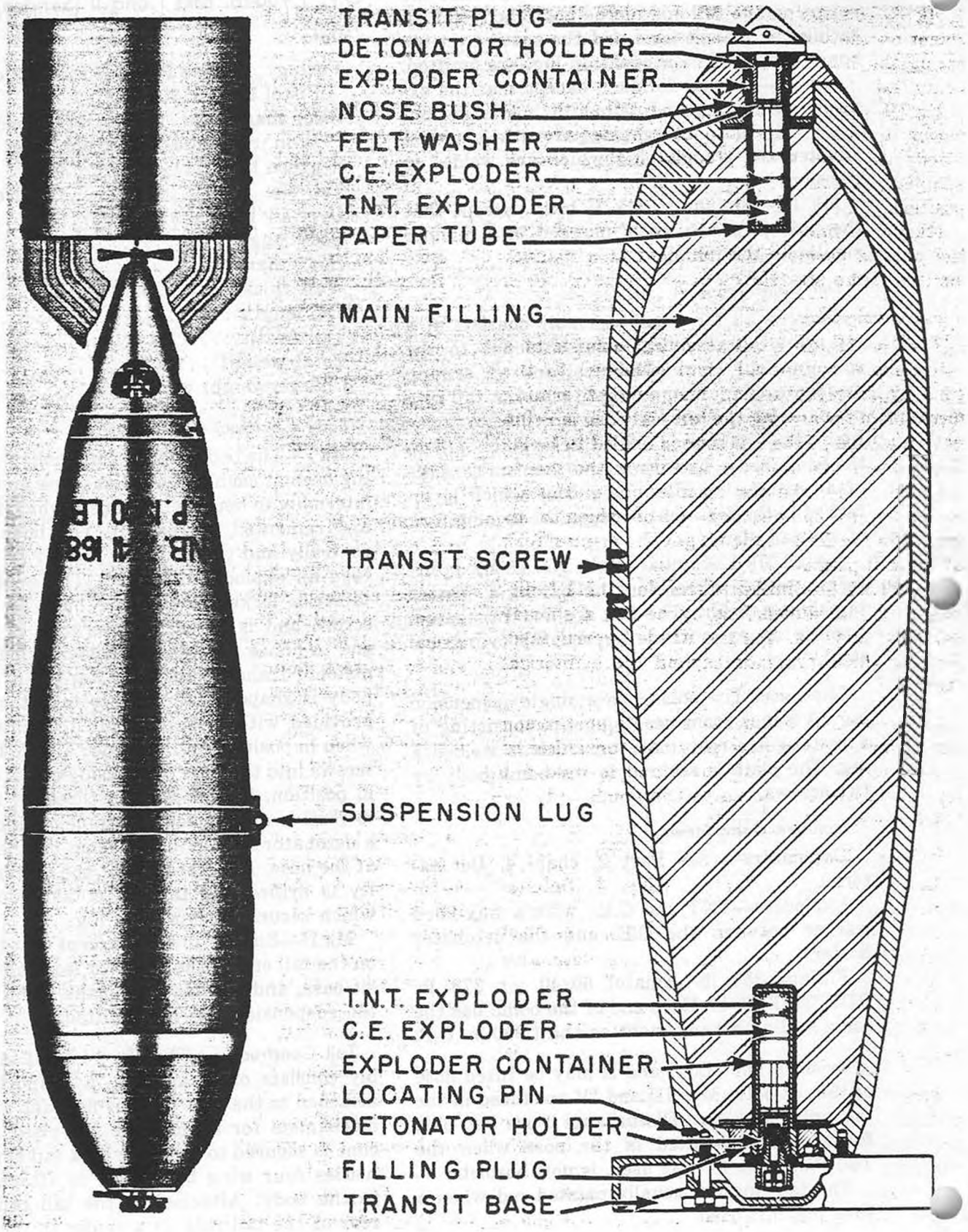

Figure 13—G.P. 1,900-lb. Bomb Mk I

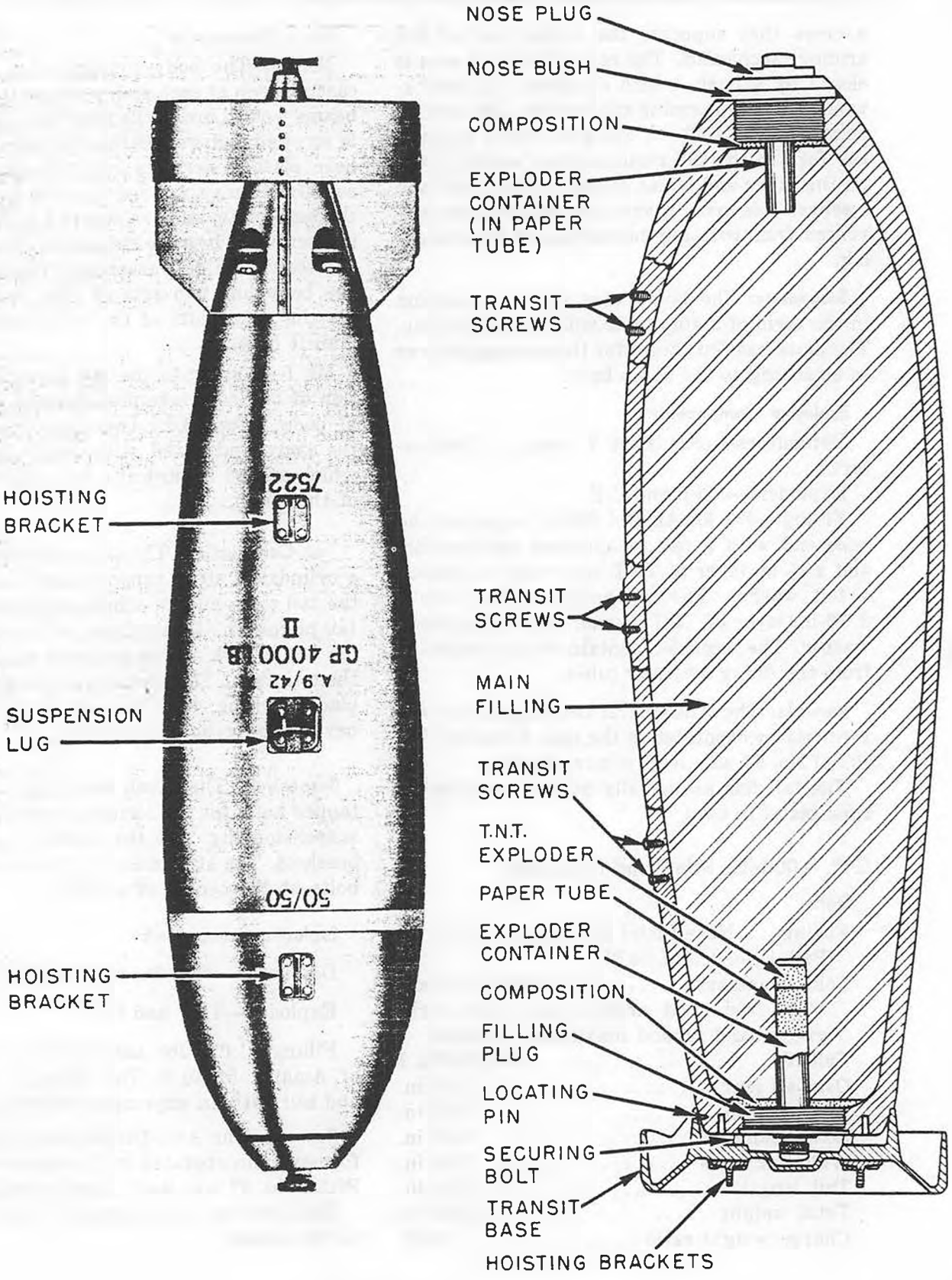

Figure 14—G.P. 4,000-lb. Bomb Mk II

a cross that supports the forked end of the arming mechanism. The rear of the tail cone is closed by a bush, which supports the arming-vane end of the arming mechanism. The arming spindle has a fork on one end, which engages the fork in the tail pistol, and an arming vane on the other end which is secured by a nut and washer. The arming vane and spindle are prevented from rotating during transit by a safety clip.

Suspension: The bomb uses single suspension in the form of a stop plate with an integral lug. The plate has four holes for the securing screws in attaching to the bomb body.

Explosive Components

Detonators—(See Part 2, chap. 4, Detonators.)

Exploders—TNT and C.E.

Filling—470 lb. Amatol 60/40, sealed at the nose end with a pad of approved composition, and a ¼-in. layer of TNT into which is pressed a felt washer. The tail end is sealed with a 3/16-in. layer of TNT, a pad, and a glazeboard washer. The exploder containers are protected from the filling by paper tubes.

Remarks: The Anti-Disturbance Fuze No. 845, formerly incorporated in the nose when the Tail Pistol No. 37 was used, is now obsolete.

The tail fins are usually painted red when a time pistol is used.

G.P. 4,000-lb., Mks I and II (Service)

Data

Fuzing....Nose Pistol No. 27, 42, or 44; Tail Pistol No. 28, 30, or 37
Color markings.....Dark green over-all; ½-in. red band around nose; 2-in. light green band around maximum diameter
Tail No. .....No. 34 Mk I
Over-all length .....106.5 in.
Body length .....79.3 in.
Body diameter .....24.5 in.
Wall thickness .....1.35 in.
Tail length .....23.5 in.
Total weight .....3,587 lb.
Charge/weight ratio 30%

Body Construction

Mk II—The body consists of a hollow steel casting open at each end, with six strengthening beams welded inside the nose end. The nose bush is screwed and welded into the nose, and a male base plate is screwed into the base. Exploder containers are threaded into the nose bush and the base plate, and are secured in place by locking screws. The rear end of the body is shaped to receive the tail assembly. The rear face of the body has two sets of four threaded holes for the wing bolts of the tail assembly, or the transit base.

Mk I—Similar to the Mk II, with the exception of two side fuze pockets near the rear end of body, afforded by two adapters welded into the body and fitted with exploder containers which extend inward at a 45° angle to the axis of the bomb.

Tail Construction: The tail assembly consists of a cylindrical strut supported by four fins from the tail cone, and an arming mechanism for the tail pistol. The forward end of the arming spindle has a fork which engages another fork of the tail pistol. The rear end is fitted with a four-bladed arming vane. The arming vanes protrude beyond the cylindrical strut.

Suspension: The bomb body has three sets of tapped holes for the securing screws of a central suspension lug, and the fore and aft hoisting brackets. The suspension lug is secured by four bolts at the center of gravity.

Explosive Components

Detonator—(See Part 2, chap. 4, Detonators.)

Exploder—TNT and C.E.

Filling—1,070 lb. Amatol 60/40 or 1,018 lb. of Amatex 51/40/9. The filling is sealed nose and tail with an approved composition.

Remarks: The Anti-Disturbance Fuze No. 845, formerly incorporated in the nose when the Tail Pistol No. 37 was used, is now obsolete.

Tail fins are usually painted red when time pistol is used.

MEDIUM CAPACITY BOMBS

Introduction

These bombs are designed for general operational use as alternatives to the corresponding G.P. bombs. They are comparable to the U. S. G.P. series, with a loading factor of approximately 50%, parallel sides, and ogival noses.

They may be fuzed at the nose and tail, or at the nose or tail only, if so desired. When shipped, they are plugged at the nose and fitted with a Tail Pistol No. 28 or No. 30 (without detonators), the pistol acting as a tail transit plug.

These bombs are painted dark green over-all, with a red band around the bomb body near the nose denoting that the bomb has been filled, and a light green band around the nose end indicating its H.E. nature. The type of filling is stencilled around the bomb body, as is the monogram of the filling station, date of filling, etc. These bombs are supplied fitted with transit bases, and the larger bombs have transit rings in addition to the bases.

M.C. 250-lb. Mks I and II (Service)

Data

Fuzing....Nose Pistol No. 27, 42, or 44; Tail Pistol No. 28, 30, or 37
Color markings.....Dark green over-all; ½-in. red band around nose, 1-in. light green band around base of ogive
Tail No.....No. 2 Mks I or II
Over-all length .....55.5 in.
Body length .....27.5 in.
Body diameter .....10 in.
Wall thickness .....0.3 in.
Tail length ..... 27 in. (approx.)
Tail width .....10 in.
Total weight.....225 lb. (approx.)
Charge/weight ratio .....50% (approx.)

Body Construction: The bomb has a solid drawn or rolled steel body. The exploder containers screw into the nose and male base plates. This bomb has parallel sides, with an ogival nose and

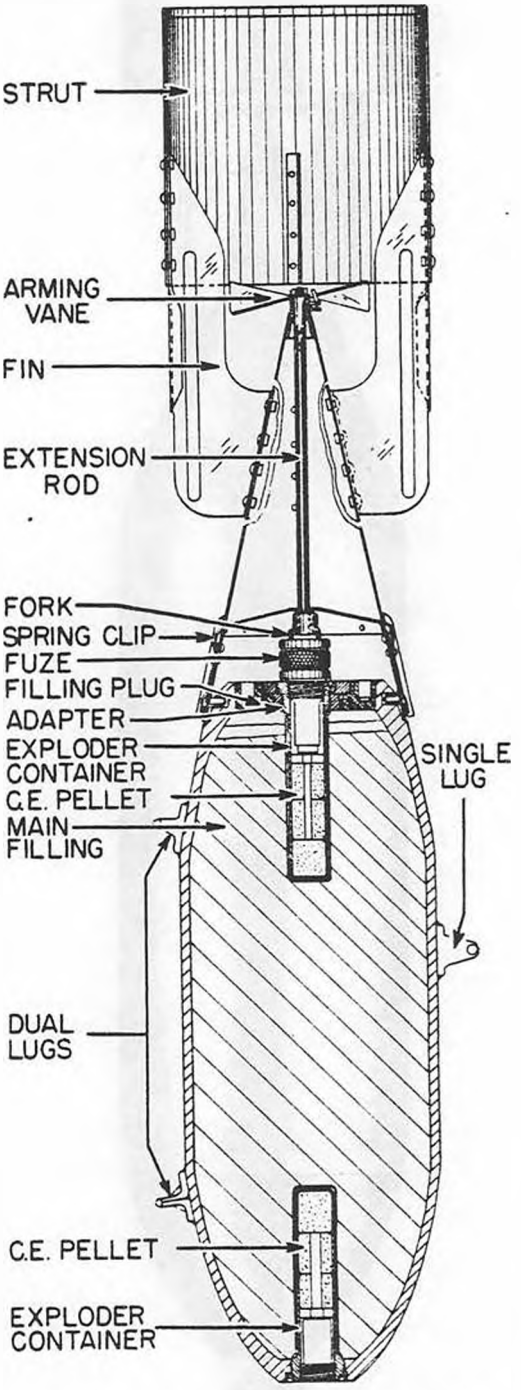

Figure 15—M.C. 250-lb. Bomb Mk II

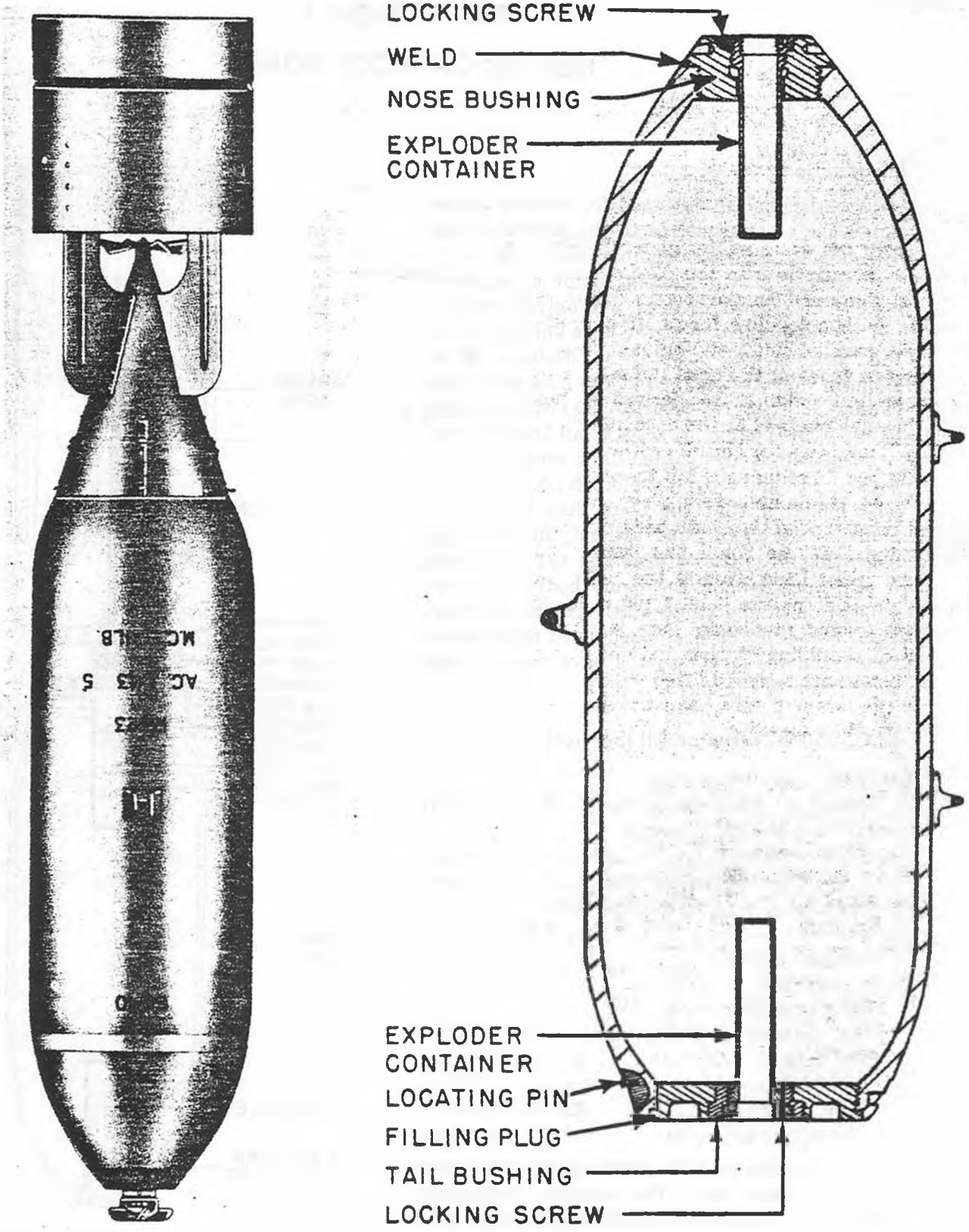

Figure 16—M.C. 500-lb. Bomb

a slight rear taper, similar to the construction of U. S. General Purpose Bombs.

Tail Construction: The tail consists of a cylindrical tail strut secured to the tail cone by four fins. The tail assembly is secured to the bomb body by four spring clips, which engage slots in the tail end of the body. A reach rod through the tail cone, having arming vanes attached to the after end, engages the arming fork in the tail pistol.

Suspension: The Bomb Mk I has a single suspension lug welded to the bomb body. The Bomb Mk II has dual lugs welded to its case for suspension from U. S. aircraft, in addition to a single lug.

Explosive Components

Detonators—(See Part 2, chap. 4, Detonators.)
Exploders—C.E. pellets
Filling—Amatol or Pentolite

Remarks: This bomb is supplied with a Tail Pistol No. 28 or 30, and may or may not be fuzed in the nose.

The Anti-Disturbance Fuze No. 845, formerly incorporated in the nose of bombs fuzed with the Tail Pistol No. 37, is obsolete.

Tail fins are usually painted red when a time pistol is used.

M.C. 500-lb. Mks I-V (Obsolescent), and Mks VI-XII (Service)

Data

Fuzing....Nose Pistol No. 27, 42, or 44; Tail Pistol No. 28, 30, or 37
Color markings...Dark green over-all; ½-in. red band around nose, 1-in. light green band around base of ogive
Tail No.....No. 2 Mk I; No. 25 Mks I or II; No. 26 Mk I; or No. 28 Mk I
Over-all length....70.6 in. (with long tail); 57.8 in. (with short tail)
Body length .....41 in.
Body diameter .....12.9 in.
Wall thickness.....0.3 in. Mks I, II, VI, VII; 0.42 in. Mks III, IV, V, VIII-XII
Tail length....No. 25 Mks I, II, 28 in.; No. 28 Mks I, II, 14 in.
Tail width .....12.9 in.
Total weight.....Mk VIII with short tail, 499 lb., Amatol filled
Charge/weight ratio.....50%

Body Construction: The bomb has parallel sides, with an ogival nose and a slight rear taper, similar in construction to U. S. General Purpose bombs.

With the exceptions as given below, exploder containers screw into the nose and base plate. Mk I: fabricated; rolled steel sheet, welded, with nose and tail welded on. Mk II: drawn tube; nose formed by "bottling" process; tail welded on. Mk III: cast. Mk IV: cast to 500-lb. G.P. dimensions. Mk V: same as Mk III, but center of gravity was off, so all were declared obsolescent immediately; used only with the long tail unit. Mks VI, VII, VIII, and IX are same as Mks I, II, III, IV, respectively, with American dual suspension lugs added. Mk X: forged body; solid nose; fuzed only in tail. Mk XI: Mk VII with a solid nose. Mk XII: Mk VII with improved welds at the after end, and fuzed both nose and tail.

Tail Construction: The Tails No. 25 and No. 28 are similar in construction, each consisting of a cylindrical strut attached to a tail cone by four fins. The tail assembly is secured to the body by four spring clips which engage slots in the tail end of the body. Turnbuckle fittings are provided for two of the springs as a locking device. A reach rod running through the tail cone, engages the arming fork of the pistol, and carries the arming vanes at its after end. The arming vanes protrude beyond the cylindrical strut and the fins on the short-type Tail Unit No. 28.

Suspension: Mks I-V of this bomb have a single suspension lug welded to the body, while Mks VI-XII have dual lugs for suspension from U. S. aircraft welded on in addition to a single lug.

Explosive Components

Detonators—(See Part 2, chap. 4, Detonators.)
Exploders—C.E. pellets
Filling—(Mk VIII), 210 lb. Amatol 50/50 or 60/40; 226 lb. Amatex 51/40/9; 222 lb. RDX/TNT 60/40; or 232 lb. Torpex 2.

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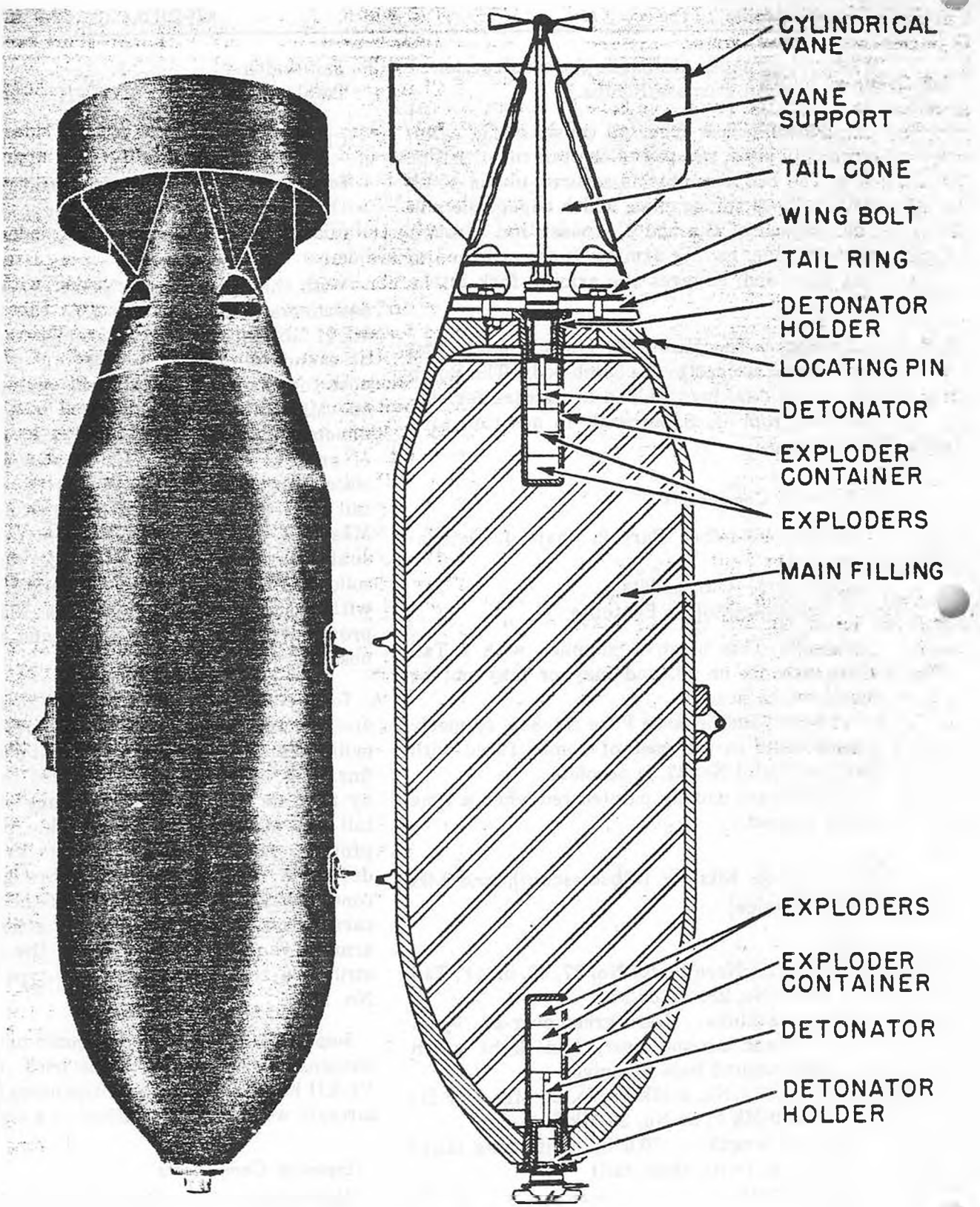

Figure 17—M.C. 1,000-lb. Bomb Mk I

Remarks: These bombs are supplied with a Tail Pistol No. 28 or No. 30, and may or may not be fuzed at the nose.

The short-type tail unit, such as the No. 28, Mk I, is used when the bombs are dropped from fighter-bomber aircraft.

The Anti-Disturbance Fuze No. 845, formerly incorporated in the nose of bombs fuzed with the Tail Pistol No. 37, is now obsolete.

Tail fins are usually painted red when time pistol is used.

M.C. 1,000-lb. Mks I and II (Service)

Data

Fuzing....Nose Pistol No. 27, 42 or 44; Tail Pistol No. 28, 30 or 37
Color markings....Dark green over-all; red band around nose, light green band around ogive of base.
Tail No. .....No. 37 Mk I
Over-all length .....72.6 in.
Body length .....52.5 in.
Body diameter .....17.75 in.
Wall thickness .....0.48 in.
Tail length .....20 in.
Tail width .....17.5 in.
Total weight.....1,021 lb., Amatol filled
Charge/weight ratio 47%

Body Construction: The bomb body is a hollow steel casting having parallel sides, an ogival nose, and a slight taper at the after end. The exploder containers thread into the nose and male base plate. This bomb is similar in appearance to U. S. General Purpose Bombs.

Tail Construction: The tail assembly consists of a cylindrical strut attached to the tail cone by four sheet-metal fins. A reach rod with arming vanes on the after end extends through the tail cone and engages an arming fork in the tail pistol. The tail is secured to the body by four wing bolts and retained in the tail ring by split pins. The arming vanes protrude beyond the cylindrical strut.

Suspension: The Bomb Mk I has a single suspension lug at the center of gravity attached to two stop plates, and dual "U" bolt suspension lugs, 180 degrees removed from the single lug, for carrying in U. S. bomb racks. Both sets of lugs are welded onto the body. The Bomb Mk II has a strengthened form of U. S. lug for dive bombers.

Explosive Components

Detonators—(See Part 2, chap. 4, Detonators.)
Exploders—C.E. pellets
Filling—475 lb. Amatol 50/50 or 60/40, or Amatex 9; 500 lb. of RDX/TNT; or 525 lb. Torpex 2.

Remarks: This bomb is supplied with a Tail Pistol No. 28 or No. 30 in position, and may or may not be fuzed in the nose.

The Anti-Disturbance Fuze No. 845, formerly incorporated in nose of bombs fuzed with the Tail Pistol No. 37, is obsolete.

Tail fins are usually painted red when a time pistol is used.

M.C. 4,000 lb. Mks I and II (Service)

Data

Fuzing....Nose Pistol No. 27, 42, or 44; Tail Pistol No. 28, 30, or 37
Color markings.....Dark green over-all; red band around nose, and light green band around ogive of base
Tail No. .....No. 38 Mk I
Over-all length .....109.5 in.
Body length .....74.5 in.
Body diameter .....30 in.
Wall thickness .....0.75 in.
Tail length .....33 in.
Tail width .....30 in.
Total weight.....3,764 lb. Amatol filled
Charge/weight ratio 58%

Body Construction: In the Bomb Mk I the exploder containers screw into the nose and male base plate. The body has parallel sides, an ogival nose, and a slight taper at the body base. It is similar in appearance to U. S. General Purpose Bombs. The Bomb Mk II has a strengthened after end due to better welding.

Tail Construction: The bomb employs a short-type tail unit, consisting of cylindrical strut attached to a tail cone by four fins. A reach rod, having arming vanes at its rear, extends through the tail cone and engages the arming fork of the tail pistol.

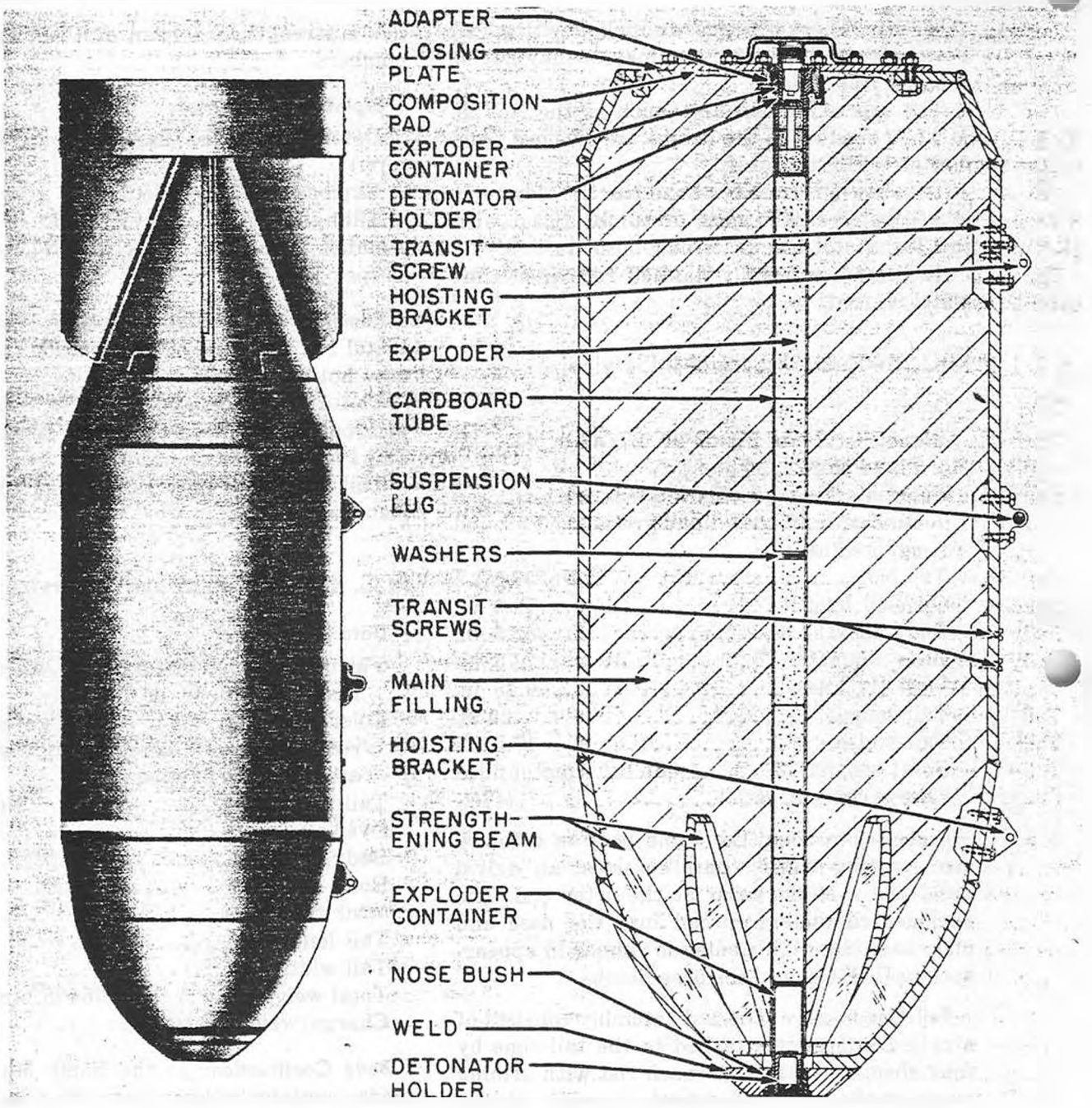

Figure 18—M.C. 4,000-lb. Bomb

Suspension: The bomb has a single lug 44 in. from the nose fuze tip, for regular suspension, and dual lugs 30 in. apart diametrically opposite the single lug for suspension from U. S. aircraft.

Explosive Components

Detonators—(See Part 2, chap. 4, Detonators.)

Exploders—C.E. pellets

Filling—2,166 lb. Amatol 60/40; 2,195 lb. Amatex 9; or 2,265 lb. RDX/TNT 60/40.

Remarks: The Anti-Disturbance Fuze No. 845, formerly incorporated in the nose of bombs fuzed with a Tail Pistol No. 37, is obsolete.

Tail fins are usually painted red when a time pistol is used.

Part I—Chapter 5

HIGH CAPACITY BOMBS

Introduction

These bombs are thin-walled and have a high charge/weight ratio. They are used for general bombardment purposes on operations where maximum blast damage is required. At the present time this series includes bombs of 2,000, 4,000, 8,000, and 12,000 pounds.

The earlier marks of these bombs are provided with side fuzing positions, which are used for special operations; the bombs normally being fuzed in the nose only. The later marks of the 2,000- and 4,000-lb. bombs, and all of the 8,000- and 12,000-lb. bombs of the series, have three nose-fuze pockets, all of which generally are used.

Central exploder tubes are at present fitted in all types of H.C. bombs, and where side fuzing positions or nose fuzing positions offset from the longitudinal axis of the bomb are used, auxiliary exploder tubes connect the fuzing positions to the central tube.

These bombs are characterized by dome-shaped noses and parallel sides, and may be fitted with nose attachments to retard the bomb in flight. Drum-type tails are generally used, although the 2,000-lb. bomb may be fitted with a parachute attachment, and the 12,000-lb. bombs sometimes incorporate the normal G.P. type tail assembly, i.e., tail cone, cylindrical strut, and four fins.

The body is usually welded together and the tail bolted on. The 8,000- and 12,000-lb. bombs consist of two and three body sections, respectively, bolted together.

H.C. bombs are supplied uncrated, and are fitted with transit rings. All fuzing positions are plugged with transit plugs. Tails, nose attachments, and parachute attachments are supplied in separate packages.

H.C. 2,000-lb. Mks II and III (Service)

Data

Fuzing....Mk III, Three Nose Pistols, No. 27, 42, or 44; Mk II, three nose fuze cavities present but only the center one can be used, with one of the above pistols.

Color markings...Dark green over-all; ½-in. red band 6 in. from front edge of cylindrical shell, and 2-in. light green band 16 in. from edge

Tail No. .....No. 39 Mk I
Over-all length .....131 in.
Body length .....89 in.
Body diameter .....18.5 in.
Wall thickness .....0.19 in.
Tail length .....40 in.
Tail width .....17.9 in.
Total weight.....1,723 lb., Amatol filled
Charge/weight ratio 71%

Body Construction: The body is a steel fabricated cylinder with a dome-shaped nose and parallel sides, and is closed by a flat plate bolted to a flange within the after end. The base flange is fitted with locating pins for the tail, and holes to receive the tail securing bolts are drilled through it.

A central tube is cemented to the stem of the central exploder container in the nose, and extends through the body almost to the closing plate. All three nose fuzing positions house exploder containers, the two side ones extending radially inward toward the central tube.

Tail Construction: The tail is a metal cylinder, having an angle ring secured at each end. Hand holes in the tail cylinder give access to the tail securing bolts, which thread through tapped bosses on the forward angle ring. Other holes in the cylinder provide stability in flight.

Suspension: The bomb uses a single suspension lug, 46 in. from the nose dome, secured by eight screws.

Explosive Components

Detonators—(See Part 2, chap. 4, Detonators.)

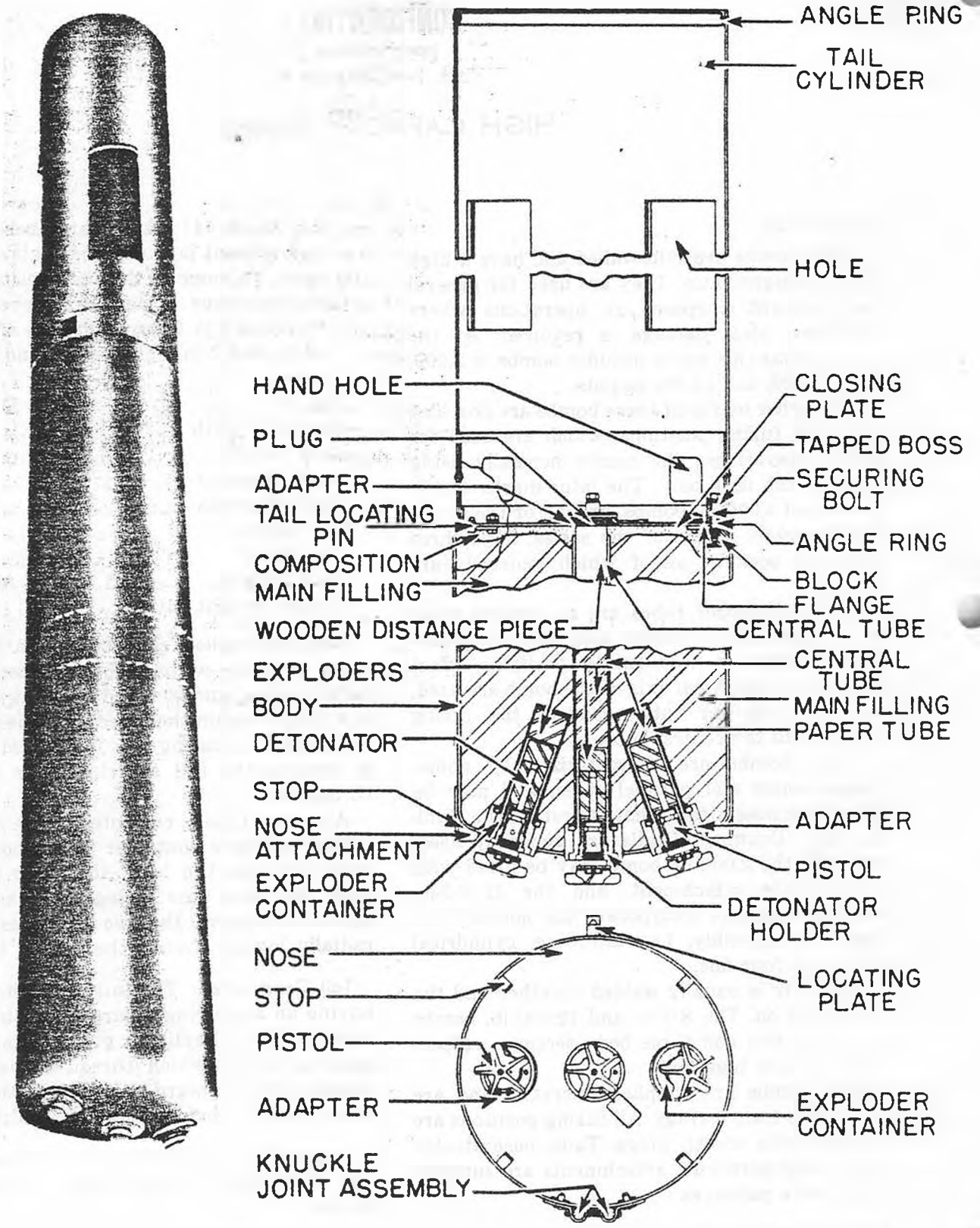

Figure 19—H.C. 2,000-lb. Bomb Mk II or Mk III

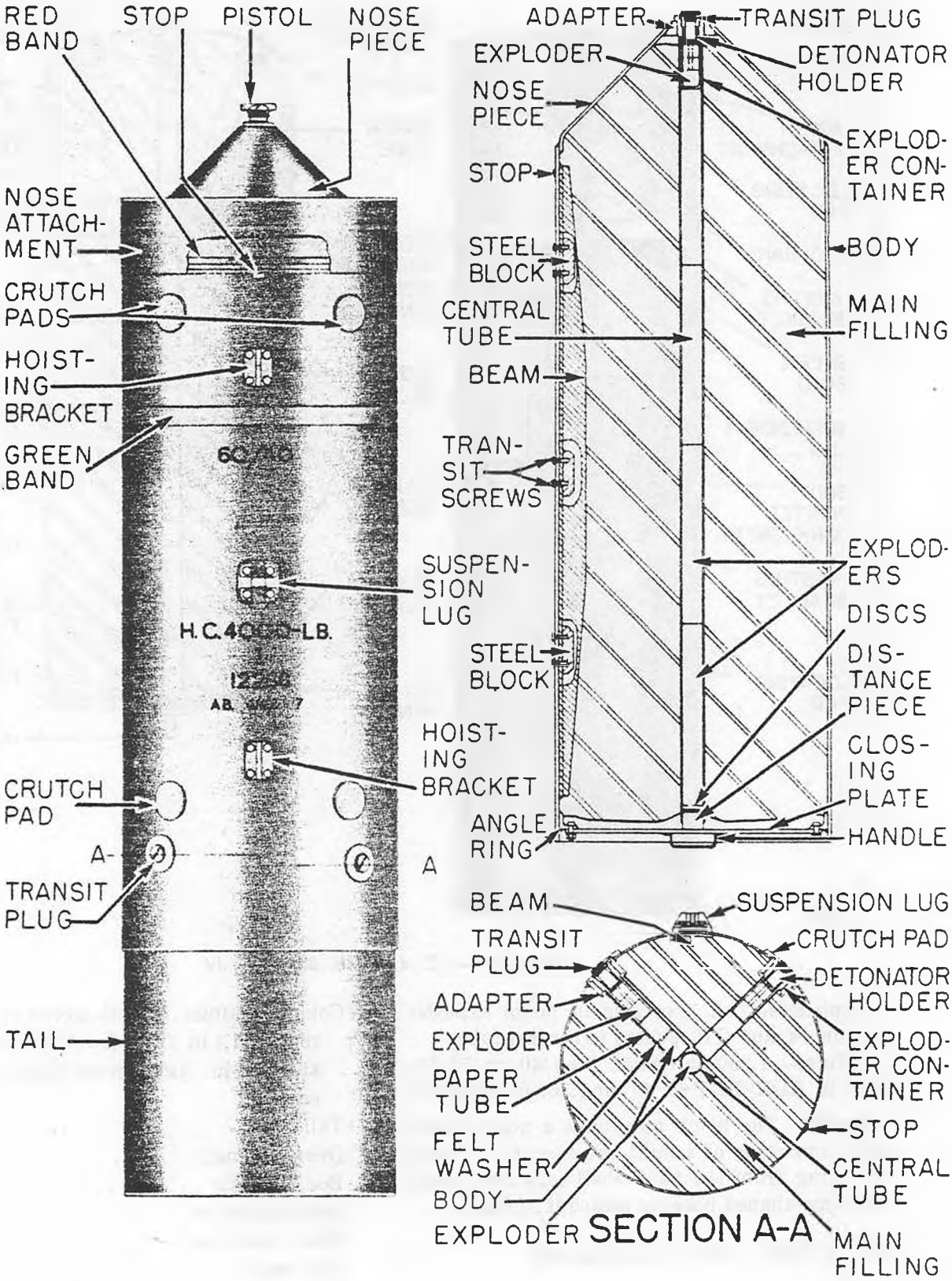

Figure 20—H.C. 4,000-lb. Bomb Mk I

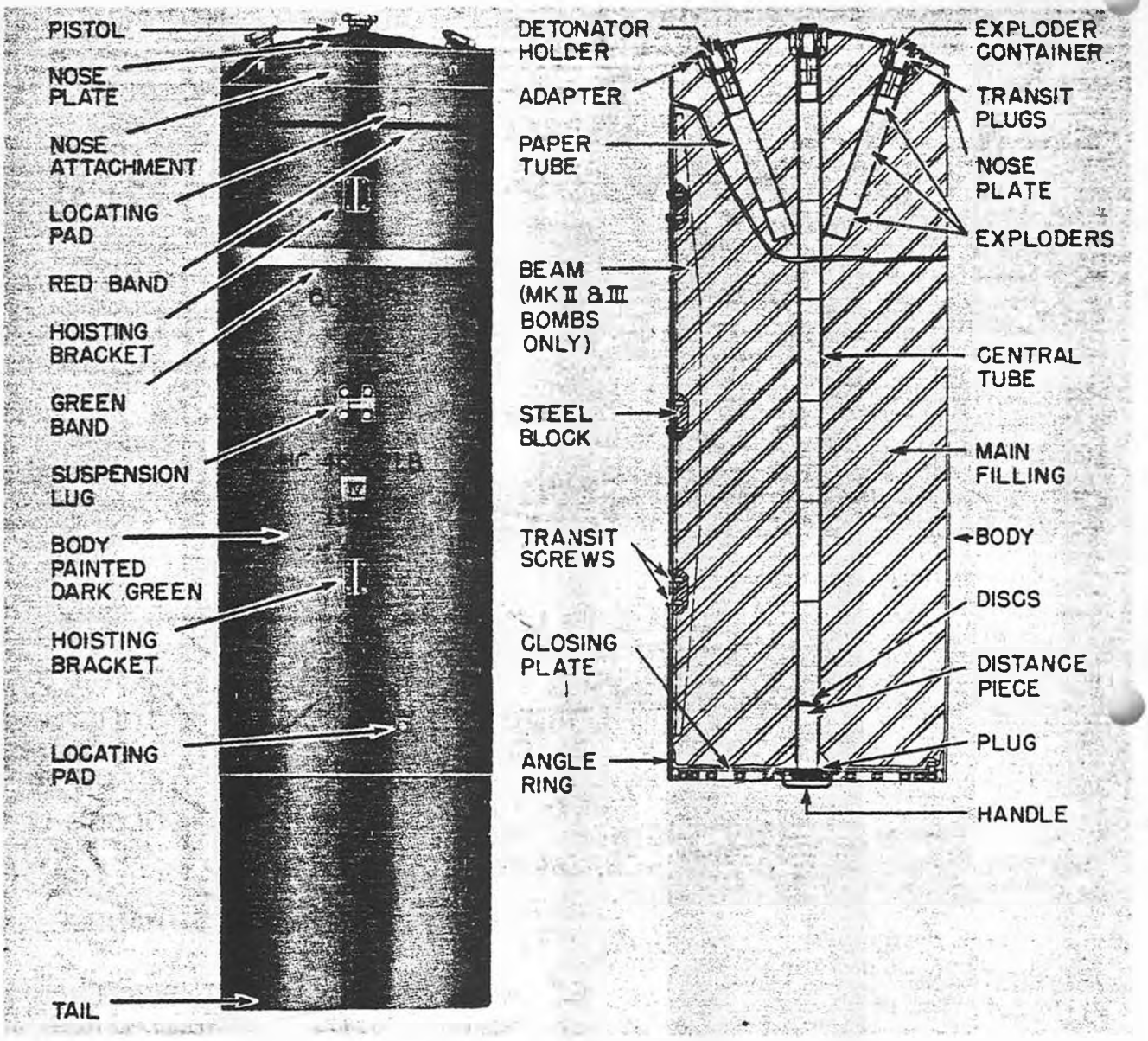

Figure 21—H.C. 4,000-lb. Bomb Mk IV

Exploders—C.E. exploder in pistol exploder containers, and C.E. pellets in central tube.

Fillings—1,230 lb. Amatol 60/40 or 50/50; 1,285 lb. RDX/TNT 60/40; or 1,360 lb. Torpex 2.

Remarks: The bomb may have a nose attachment consisting of a light-gauge metal cylinder extending from the body shell forward around the dome-shaped nose, to retard it in flight.

H.C. 4,000 lb. Mk I (Obsolescent)

Data

Fuzing...One Nose Pistol, No. 27, 42, or 44; two side fuze pockets not used

Color markings...Dark green over-all; ½-in. red band 1 in. from front edge of cylindrical shell; 2-in. light green band 16 in. from edge.

Tail No.	No. 24 Mk I
Over-all length	115 in.
Body length	88.5 in.
Body diameter	30 in.
Wall thickness	0.31 in.
Tail length	27 in.
Tail width	29.3
Total weight	3,920 lb.
Charge/weight ratio	73%

Body Construction: The body is a cylindrical shell which has a hollow, conical nose piece welded to it, parallel sides, and a closing plate bolted to an angle ring. The angle ring is welded in position a short distance inside the after end. The shell is strengthened by a T-section beam welded to its inner surface. Steel blocks, constituting pads for suspension lug and hoisting brackets, are welded in the angles of the beam. The central tube is fitted over, and cemented to, the stem of the exploder container, extending almost to the closing plate. Two exploder containers are fitted near the rear of bomb at 45° angles to the strengthening beam.

Tail Construction: The tail is a cylinder of light-gauge plate, closed at rear by a diaphragm plate which is welded in position. Tail securing screws thread into corresponding holes near the rear edge of the body shell. The forward portion of the cylinder has saw-cuts between adjacent screw clearance holes, so that the tail can be sprung into the rear of the bomb body.

Suspension: A single suspension lug at the center of gravity is bolted to the body and internal strengthening beam.

Explosive Components

Detonators—(See Part 2, chap. 4, Detonators.)

Exploders—Exploder containers house one solid and two perforated C.E. pellets. The central tube is filled with 36 pellets of pressed TNT.

Filling—2,882 lb. of Amatol 60/40.

Remarks: This bomb may be fitted with a nose attachment to retard it in flight, consisting of a light-gauge plate around the forward end of the shell, which projects beyond it around the conical nosepiece. Side fuze pockets are usually not used, but might contain a Time Pistol No. 47.

H.C. 4,000-lb. Mks II and III (Obsolescent), and Mks IV, V, and VI (Service)

Data

Fuzing....Three Nose Pistols, Nos. 27, 42, or 44; side fuze pockets on Mk II not used
Color markings...Dark green over-all; ½-in. red band 8 in. from nose; 2-in. light green band 2 in. from nose.
Tail No. .....No. 24 Mk I
Over-all length .....110 in.
Body length .....82 in.
Body diameter .....30 in.
Wall thickness .....0.31 in.
Tail length ..... 27 in.
Tail width .....29 in.
Total weight.....3,930 lb., Amatol filled
Charge/weight ratio ... .75%

Body Construction: The body consists of a fabricated steel, cylindrical shell with a domed plate welded to the nose end, parallel sides, and a closing plate bolted to the angle ring, which is welded in position a short distance inside the after end. The closing plate has a central adapter for a screw-in plug and two drop handles. The nose dome houses three exploder containers, the center one of which is extended through the body by a central tube. The Mk II has two side fuze pockets near the rear of the body. Mks II and III have strengthening beams running fore and aft, welded to the inner surface of the body, and acting as a pad for the suspension lug and hoisting brackets. The Mk IV has steel blocks to support the suspension lug and hoisting brackets, and has no beam.

Tail Construction: The tail is a cylinder of light-gauge plate, closed at the rear by a diaphragm plate which is welded in position. Tail securing screws thread into corresponding holes near the rear edge of the body shell. The forward portion of the cylinder has saw-cuts between adjacent screw clearance holes, so that the tail can be sprung into the rear of the bomb body.

Suspension: A single suspension lug, 43 in. from nose dome, is bolted to the bomb body and the steel support block.

Explosive Components

Detonators—(See Part 2, chap. 4, Detonators.)

Exploders—C.E. pellets in exploder containers and central tube.

Filling—Mk II, 2,954 lb. Amatol 60/40; Mk III-VI, 2,960 lb. Amatol 50/50 or 60/40, 3,070 lb. RDX/TNT 60/40, 3,088 lb. Minol 2, or 3,294 lb. Torpex 2.

Remarks: These bombs may be fitted with a nose attachment to retard them in flight, consisting of light-gauge plate around the forward

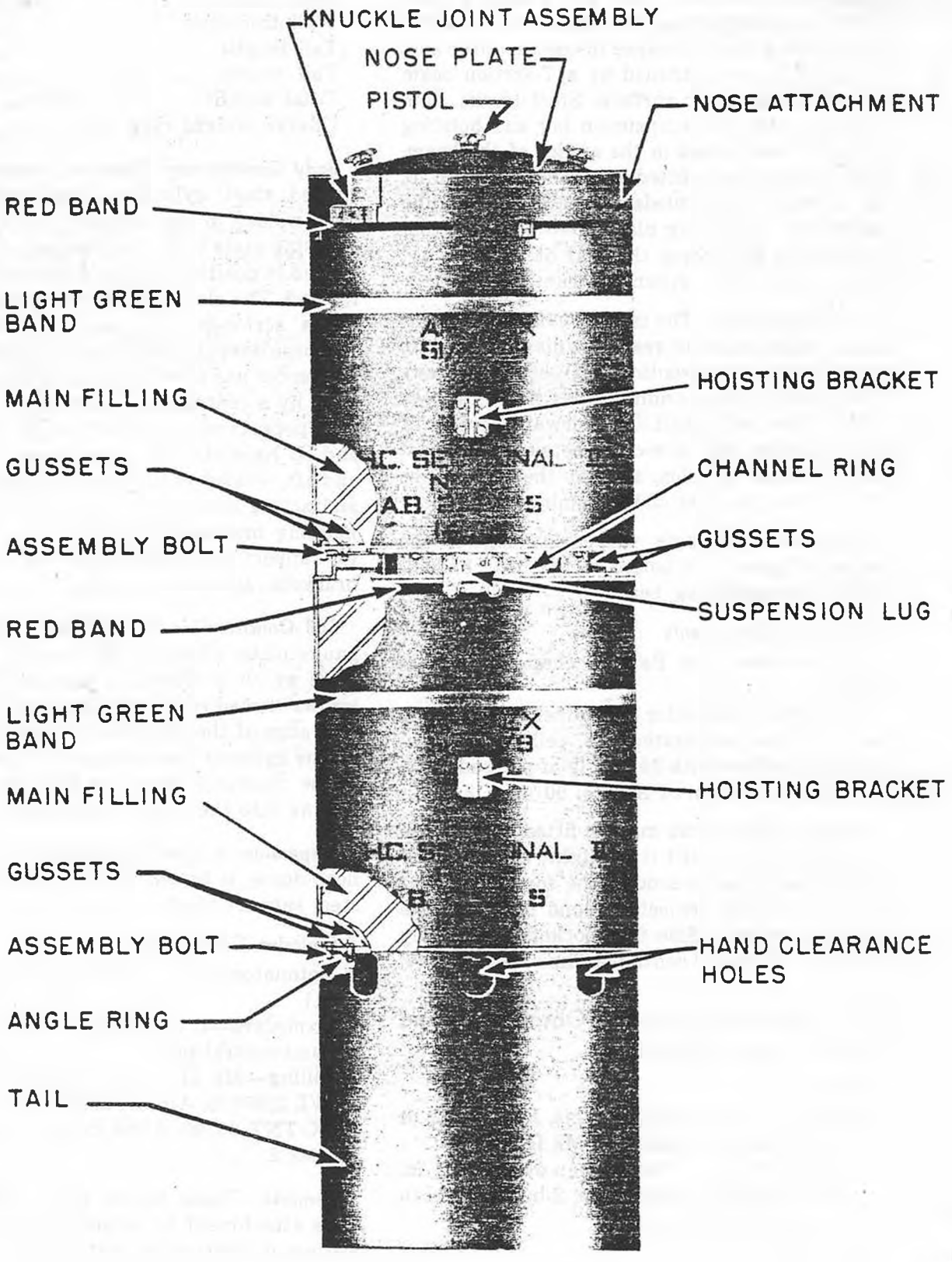

Figure 22—H.C. 8,000-lb. Bomb Mk II

end of the body shell which projects beyond it around the nose piece. The side fuze pockets on the Mk II are usually not used but might contain a Time Pistol No. 47.

The Mk V is the same as Bomb Mk IV, but was made and filled in the U. S. The Bomb Mk VI was made in U. S., and has a metal box for lugs and other fittings welded to the rear of the bomb body.

H.C. 8,000-lb., Sectional, Mks I and II (Obsolescent)

Data

Fuzing.....Three Nose Pistols, Nos. 27, 42, or 44
Color markings....Dark green over-all; 1-in. bright red band and 2-in. light green band around each of the bomb body sections
Tail No.....No. 33 Mk I, or No. 52 Mk I
Over-all length .....133.6 in.
Body length....Front Section, 3 ft. 11.15 in.; Rear Section, 3 ft. 11.75 in.
Body diameter .....38 in.
Wall thickness .....0.5 in.
Tail length.....No. 33 Mk I, 36.5 in.; No. 52 Mk I, 64.0 in.
Tail width .....37.8 in.
Total weight.....7,860 lb., Amatex 9 filled
Charge/weight ratio 68%

Body Construction: The bomb consists of two cylindrical sections, each approximately 4 ft. long and 3 ft. 2 in. in diameter, connected together by bolts. The front section has a domed nose plate welded to the body, and houses three exploder containers. A flat closing plate at the rear is bolted to an end ring, which is fitted with assembly bolts for connecting the two sections. An additional exploder container is fitted into a central bush in the rear closing plate. The rear section is closed at each end by plates. The forward plate is welded to a channel ring having holes circumferentially located to receive the assembly bolts of the forward section. The exploder container fits into the forward closing plate of the rear section. Central exploder tubes extend through both sections. Joining rings are cast in the Mk I and fabricated by welding in the Bomb Mk II.

Tail Construction: The Tail No. 33 Mk I consists of a hollow steel-plate cylinder open at the after end, with an angle ring welded or riveted in its forward end. The angle ring is drilled to take the assembly bolts of the rear body section for attaching the tail. Hand clearance holes give access to the assembly bolts during assembling of the tail to the bomb.

The Tail No. 52 Mk I has a cone with hand holes for access to the securing bolts, and a cylindrical strut attached to the cone by six fins which are welded to both the strut and the cone.

Suspension: The bomb is suspended by a single suspension lug, secured by four bolts to steel block pads on the channel ring and immediately abaft the ring on the rear body section, 50 in. from the bomb nose. This point represents the center of gravity.

Explosive Components

Detonators—(See Part 2, chap. 4, Detonators.)

Exploders—All exploder containers and exploders in the central tube of both sections are filled with C.E. pellets.

Filling—5,361 lb., Amatex 9; or 5,850 lb., Torpex 2.

Remarks: This bomb can be fitted with a cylindrical nose attachment, placed around the nose of the forward section and protruding around the domed nose, to retard bomb in flight. This bomb is not composed of two regular 4,000 lb. H.C. bombs, but of sections weighing approximately 4,000 lb., designed especially for it.

H.C. 12,000 lb., Sectional, Mk II (Service)

Data

Fuzing.....Three Nose Pistols, Nos. 27, 42, or 44
Color markings....Dark green over-all; 1-in. bright red band and 2-in. light green band around each of the bomb body sections
Tail No. .....No. 33 Mk I, or No. 52 Mk I
Over-all length .....196 in.
Body length .....Each of three sections approximately 4 feet long
Body diameter .....38 in.
Wall thickness .....0.50 in.
Tail length.....No. 33 Mk I, 36.5 in.; No. 52 Mk I, 64.0 in.
Tail width .....38 in.

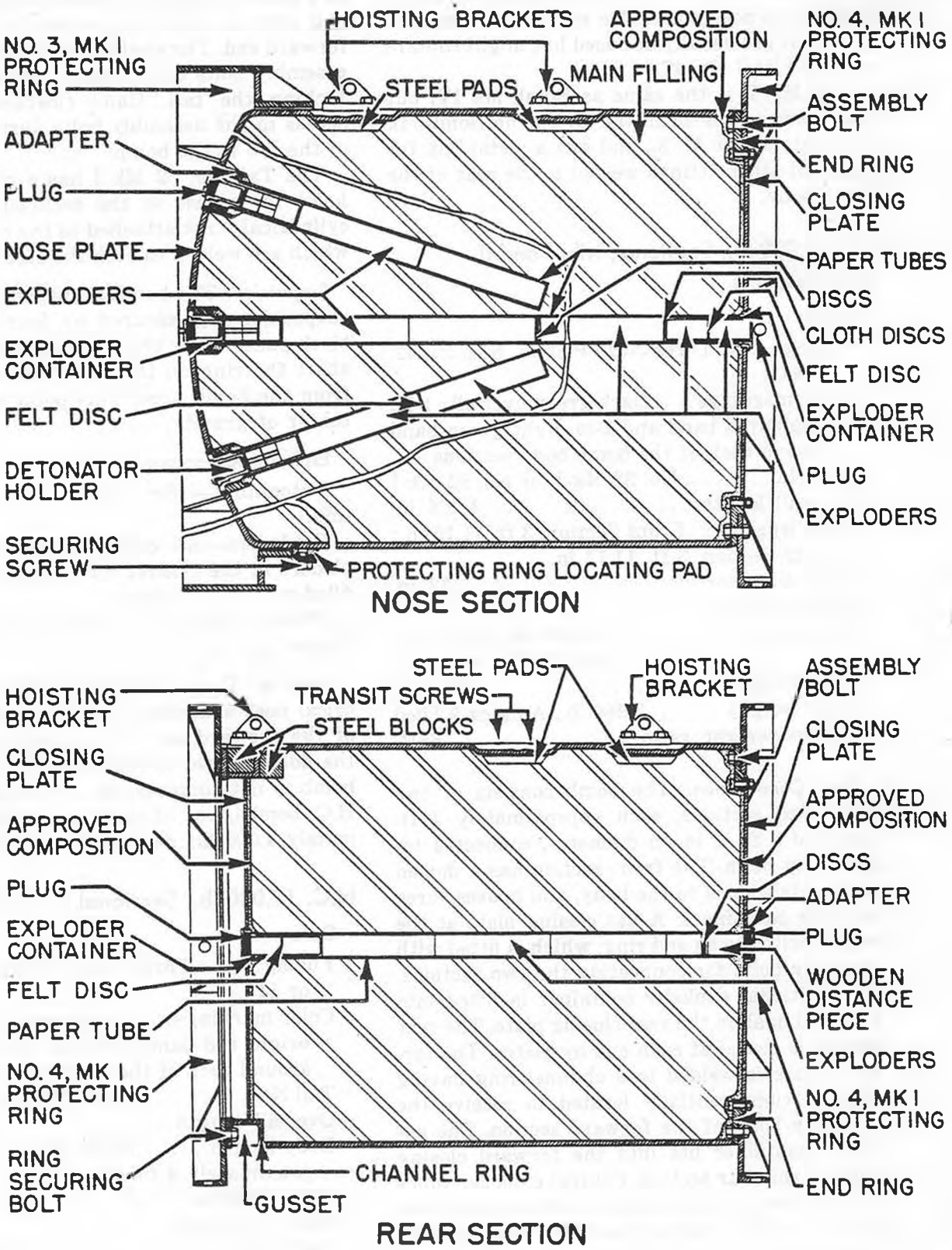

Figure 23—H.C. 8,000- and 12,000-lb. Bomb sections

Total weight.....11,936 lb., Amatex 9 filled
Charge/weight ratio .....70% (approx.)

Body Construction: The bombs consist of three sections bolted together. It is identical to the 8,000 lb. H.C., with an additional rear body section. Joining rings are fabricated by welding, not cast as in Mk I section used in 8,000 lb. H.C.

Tail Construction: The Tail No. 33 Mk I is a hollow steel plate cylinder open at the after end, with an angle ring welded or riveted onto the forward end and drilled to take the assembly bolts of the rear body section for attaching tail. Hand clearance holes give access to the assembly bolts.

The No. 52 Mk I has a tail cone with hand holes for access to the securing bolts and a cylindrical strut, attached to the cone by six fins which are welded to the strut and cone.

Suspension: The bomb is suspended by dual suspension lugs, each secured by four bolts to the two channel rings connecting the three body sections.

Explosive Components

Detonators—(See Part 2, chap. 4, Detonators.)
Exploders—C.E. pellets
Filling—8,040 lb. Amatex 9, or 8,760 lb. Torpex 2

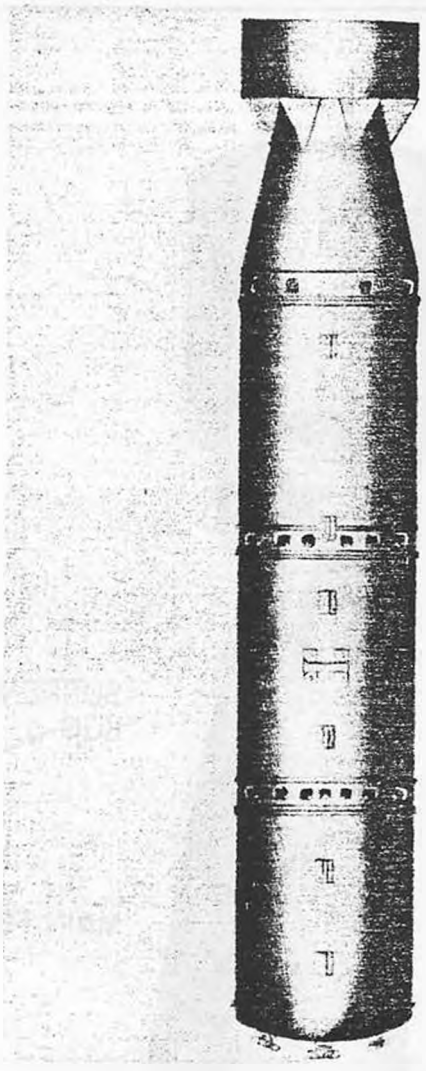

Figure 24—H.C. 12,000-lb. Bomb Mk II

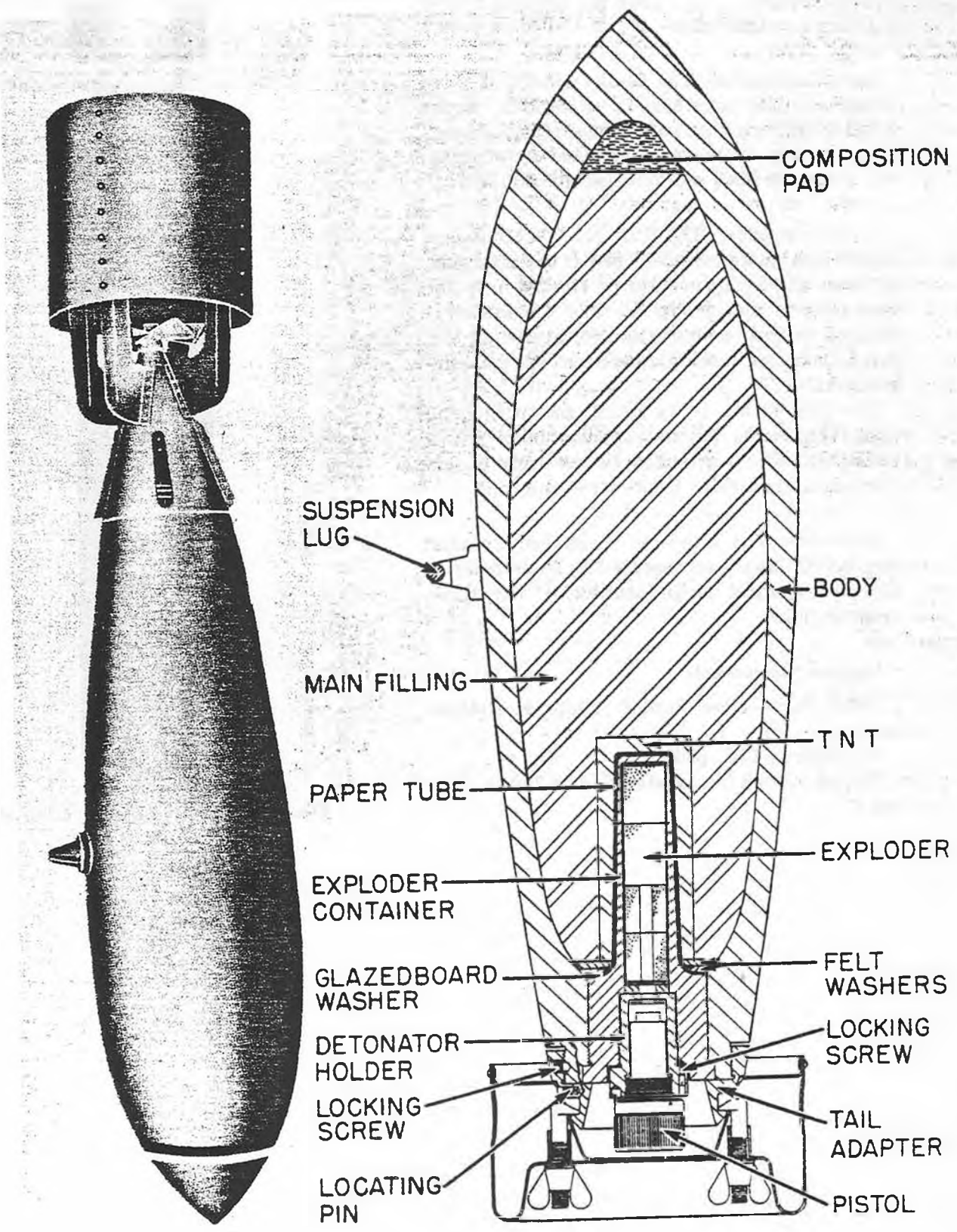

Figure 25—S.A.P. 250-lb. Bomb Mk V

Part I—Chapter 6

SEMI-ARMOR-PIERCING AND ARMOR-PIERCING BOMBS

Introduction

There are two British S.A.P. bombs in present service use. They are designed for penetration of resistant targets, such as reinforced concrete or medium armored targets, where penetration is required before the bomb detonates.

Only one A.P. bomb, the 2,000 lb., is used by the British. It is used for attacks against heavily armored targets, such as capital ships, and is so constructed and fuzed that the bomb does not break up on impact. Detonation does not occur until after the target is penetrated. A 450-lb. A.P. bomb was used early in the war, constructed along the same lines as the 2,000 lb., but it is now obsolete.

Both the A.P. and S.A.P. bombs are fuzed in the tail only. Earlier marks were designed to receive a tail fuze, but later marks are fitted for a pistol/detonator combination. In later marks, the pistol used for fuzing is supplied in position in the bomb, without detonators, where it acts as a tail transit plug.

S.A.P. bombs are dark green over-all, with a white band on the nose just before a red band. The actual construction is similar to the G.P. bombs, but the case is thicker, and they are even more streamlined. They are normally filled with TNT, and have a loading factor of about 20 per cent. Mks I, II, III, and IV have tails secured by a fuze locking ring which is threaded left-handed, while the Mk V has a clip-on tail.

A.P. bombs are dark green in color. The nose is painted light green to the point of widest diameter. Two white bands, separated by a red band, are painted around the nose. The bombs are of one-piece construction, and are filled with shellite, which consists mainly of picric and is very insensitive. The loading factor is about 10 per cent.

S.A.P. 250-lb. Mks II and III (Obsolete), and Mks IIC, IIIC and V (Service)

Data

Fuzing....Mks II-IV, Tail Fuze No. 30; Mk V, Tail Pistols No. 28 or No. 30
Color markings...Dark green over-all; ½-in. white band 3 in. from nose; ½-in. red band 3½ in. from nose; 1-in. light green band 6.5 in. from nose
Tail No.....Mks II and III, No. 1 Mk I: Mk V, No. 10 Mk I
Over-all length .....49 in.
Body length .....31.5 in.
Body diameter .....9.2 in.
Wall thickness.....0.91 to 0.99 in. at maximum diameter and 0.61 to 0.69 in. at minimum thickness beginning 16.8 in. abaft nose
Tail length....No. 10 Mk I and No. 5 Mk I, 18 in.
Tail width .....9.2 in.
Total weight .....245 lb.
Charge/weight ratio 17%

Body Construction: The Mk V body is forged steel with a pointed nose and an open base, threaded internally to receive the exploder container, which is cemented in position. The base of the body is threaded externally to receive a tail adapter, which is in form of a coned ring with four equi-spaced slots to receive the spring clips of the tail. Earlier marks were similar to the Mk V, with slight variations in the tail adapter.

Tail Construction: The Tail No. 10 Mk I has a tail cone with a cylindrical strut attached by four fins. It is attached to the bomb body by four spring clips. The arming spindle engages the fork in the tail pistol. The Tail No. 1 Mk I, used on Bombs Mk II and III has no spring clips, while the Tail No. 3 Mk I used on Bombs Mk IIC, Mk IIIC, does have spring clips.

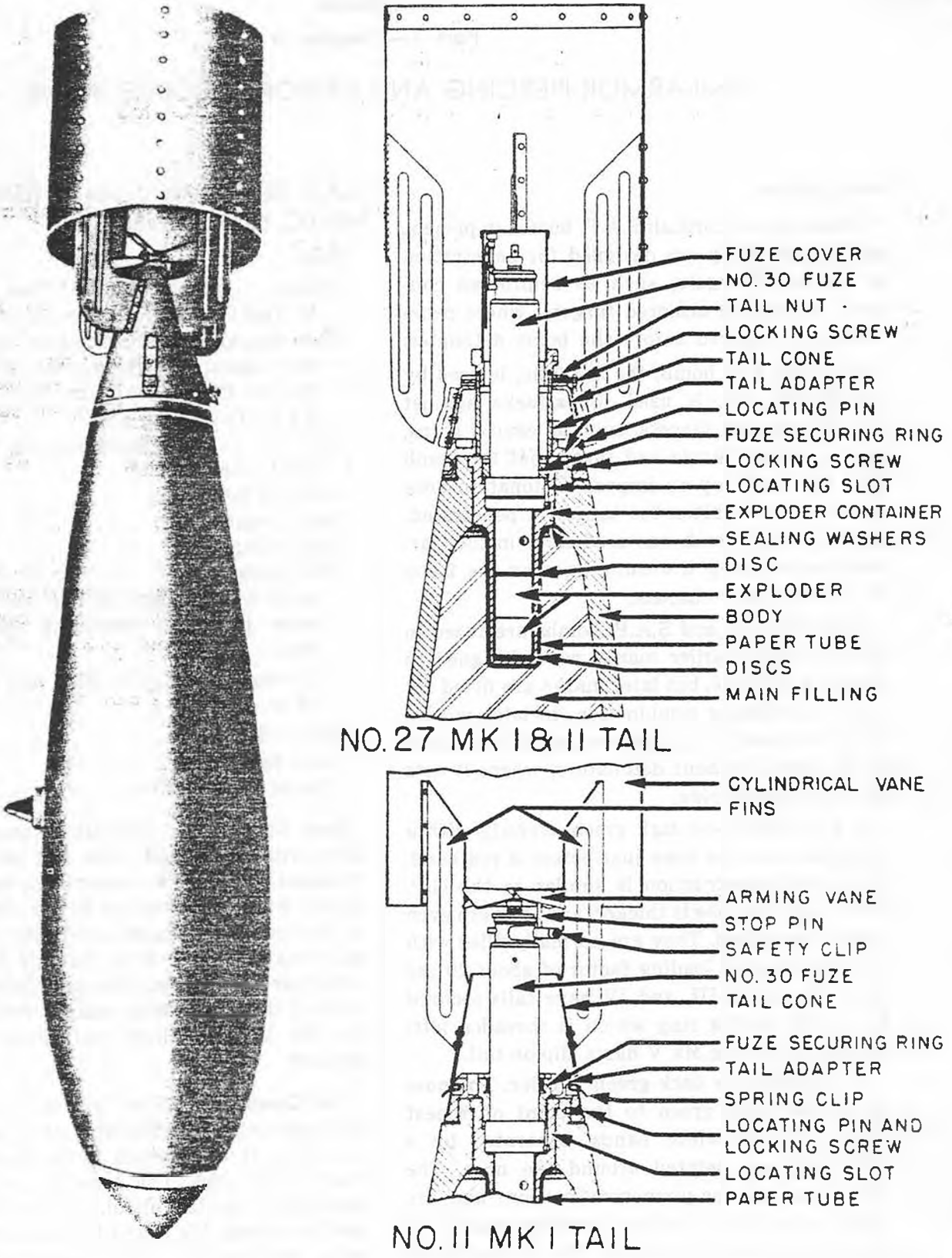

Figure 26—S.A.P. 500-lb. Bomb Mk V

Suspension: A single suspension lug is secured to the body by four screws.

Explosive Components

Detonators—(See Part 2, chap. 4, Detonators.)

Exploders—C.E. pellet in Mks II-IV, and H.E. in the Mk V. On the Mk V, there is a separate layer of TNT around the exploder.

Filling—Mk V, 40.5 lb. TNT/Beeswax; Mks II-IV, 41.5 lb. TNT.

Remarks: The Tail Fuze No. 30 has left-hand threads on the securing ring. Use of the Tail Pistol No. 37 is unlikely.

Tail fins are usually painted red when the Time Pistol No. 37 is used.

Any mark may be found fitted with a copper driving band for proof firing from the B.L. 9.2-in. howitzer.

S.A.P. 500-lb. Mks II and III (Obsolete), and Mks IIC, IIIC, and V (Service)

Data

Fuzing.....Mks II-IV, Tail Fuze No. 30; Mk V, Tail Pistols No. 28 or No. 30
Color markings...Dark green over-all; ½-in. white band 3 in. from nose; ½-in. red band 3½ in. from nose; 1-in. light green band 8 in. from nose
Tail No.....Mks II and III, No. 1 Mk I; Mks IIC and IIIC, No. 4 Mk I; Mk V, No. 11 Mk I, or No. 27 Mk I
Over-all length .....62 in.
Body length .....41.8 in.
Body diameter .....11.5 in.
Wall thickness.....1.22 in. to 1.32 in. at maximum diameter and 0.82 in. to 0.92 in. at minimum thickness beginning 23 in. abaft nose
Tail length.....No. 6 Mk I, 21 in.; No. 11 Mk I, 20.4 in.; No. 27 Mk I, II, 9.24 in.
Tail width .....11.5 in.
Total weight .....490 lb.
Charge/weight ratio 18%

Body Construction: The Mk V body is forged steel with a pointed nose and an open base, threaded internally to receive the exploder container, which is cemented in position. The base of the body is threaded externally to receive the tail adapter, which is in form of a coned ring with four equi-spaced slots to receive the spring clips of the tail. Earlier marks were similar to the Mk V, with slight variations in the tail adapter.

Tail Construction: The Tails Nos. 27 Mks I and II are the short-type tail unit with arming vanes protruding beyond the strut and fins. The Tail Assembly No. 11 Mk I consists of a tail cone with a cylindrical strut attached by means of four fins. It is attached to the bomb body by four spring clips. The arming spindle engages the fork in the tail pistol. The Tail No. 1 Mk I used on Bombs Mk II and Mk III has no spring clips, while the No. 4 Mk I tail used on Bombs Mk IIC and Mk IIIC does have spring clips.

Suspension: A single suspension lug is secured to the body by four screws.

Explosive Components

Detonators—(See Part 2, chap. 4, Detonators.)

Exploder—C.E. and TNT in Mks II-IV; C.E. only in Mk V. There is no separate layer of TNT around the exploder as in the 250-lb. S.A.P. Mk V.

Filling—Mks II-IV, 90 lb. TNT; Mk V, 89 lb. TNT.

Remarks: The Tail Fuze No. 30 has left-hand threads on the securing ring.

Use of the Tail Pistol No. 37 is unlikely, but if used, tail fins are usually painted red.

The Bomb Mk I is very old and will not be found. The Mk IV bomb was manufactured, but never filled.

A.P. 2,000-lb. Mks I, II, III and IV (Service)

Data

Fuzing....Mks I, II, and III, Tail Fuze No. 37; Mk IV, Tail Pistol No. 30
Color markings....Dark green over-all, with light green nose; three ½-in. bands, white, red, and white respectively, painted 4 in. to 5½ in. from tip of nose
Tail No.....Mk I, No. 1 Mk I; Mks II and III, No. 10 Mk I; Mk IV, No. 47 Mk I
Over-all length .....113.0 in.

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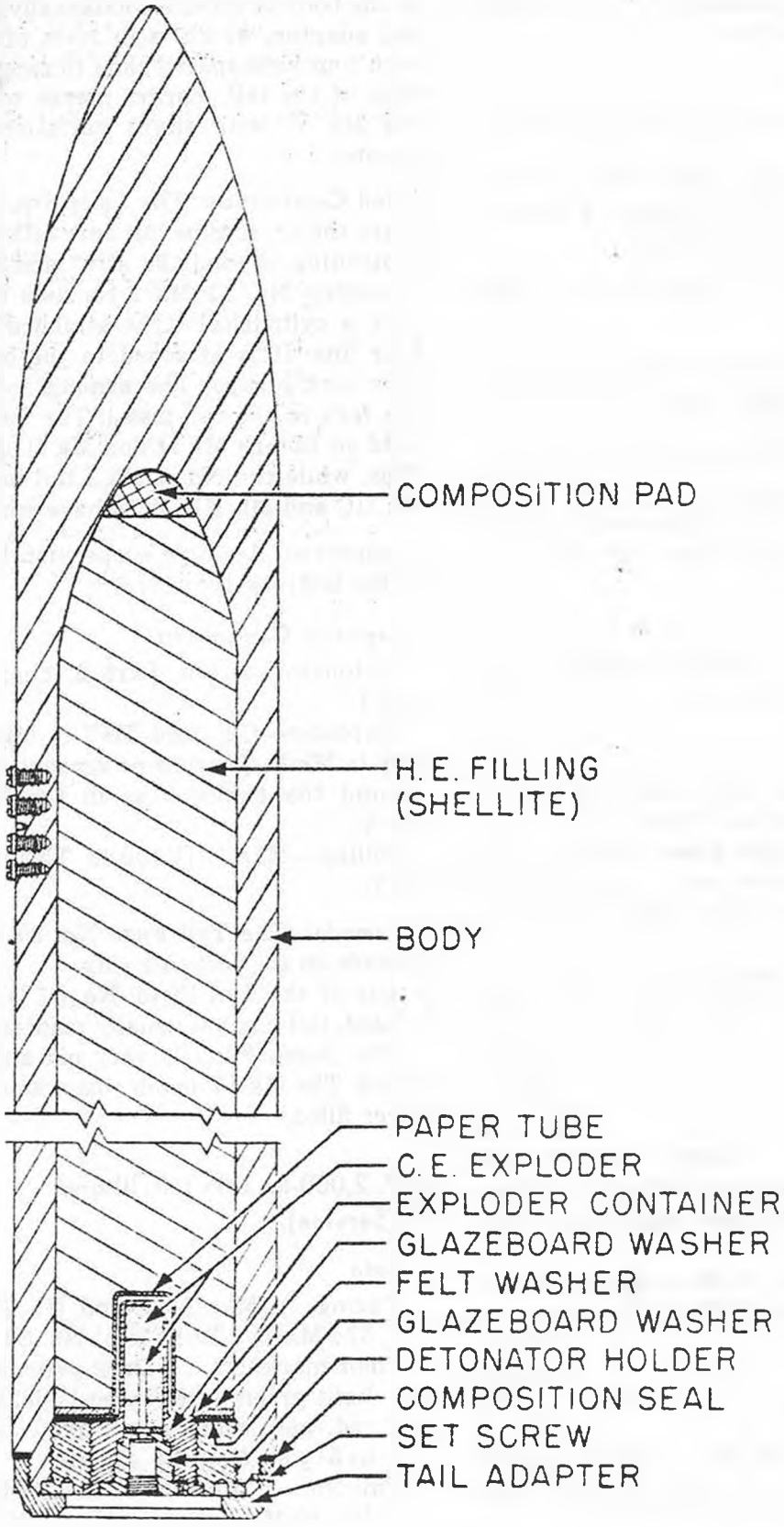


Figure 27—A.P. 2,000-lb. Bomb

Body length	80.0 in.
Body diameter	13.5 in.
Wall thickness	2.4 in. (approx.)
Tail length	35.5 in.
Tail width	13.5 in.
Total weight	1,934 lb.
Charge/weight ratio	9%

Body Construction: The Bomb Mk I has a forged steel body with a solid nose approximately 1.9 ft. long and a slight taper from the maximum diameter to the tail. The base is threaded externally to take a tail adapter, and internally to take a base adapter, which receives the exploder container. The fuze is locked in position by a fuze securing ring. The Mks II and III are similar to the Mk I, except for the tail adapter, which has four equi-spaced holes threaded for attachment of the tail. The Mk IV is modified to take a Tail Pistol No. 30.

Tail Construction: The Tail No. 1 Mk I is of aluminum alloy, consisting of a cylindrical strut attached to the tail cone by four vanes. It fits over the tail adapter and is secured by six screws. The Tail No. 15 Mk I is similar to the No. 1 Mk I, but is made of steel. It has a strengthening ring two inches from the base, and is secured to the tail adapter by four wing bolts. The Tail No. 47 Mk I consists of a cylindrical strut secured to the tail cone by four fins which are riveted on. A reach rod extends through the tail cone, and is supported by a spider.

Suspension: The bomb is suspended from the plane by two suspension bands.

Explosive Components

Detonators—(See Part 2, chap. 4, Detonators.)

Exploder—C.E. issued in position in exploder container

Filling—166 lb. Shellite, with a composition pad in the forward end of the cavity, sealed aft with washers and cement. Shellite is a very insensitive explosive consisting of 70% picric and 30% dinitrophenol.

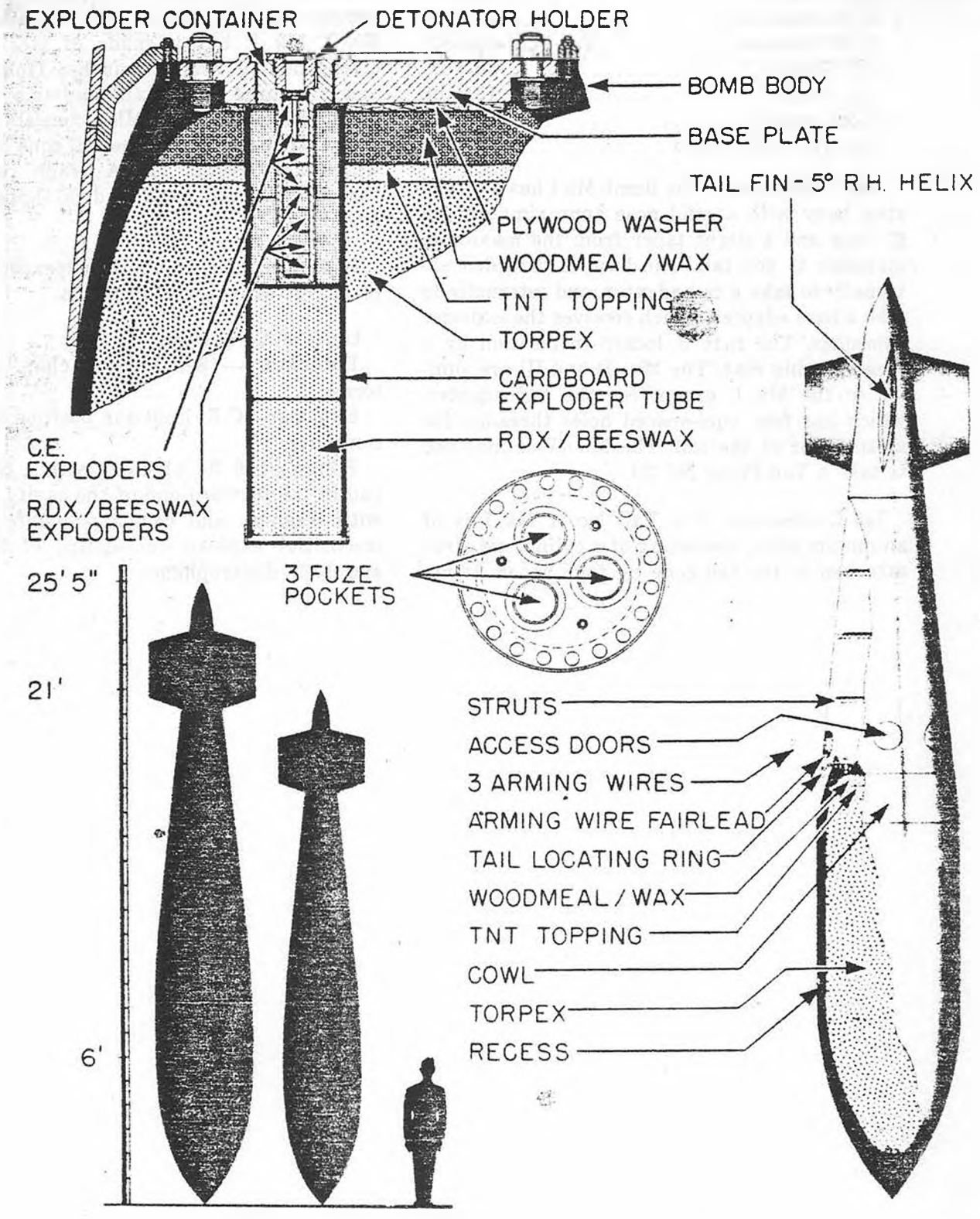


Figure 28—D. P. 12,000-lb. and 22,000-lb. Bomb

DEEP PENETRATION BOMBS

Introduction

These bombs were designed for special operational uses to give deep penetration of the earth and to produce heavy shock waves as a result of the explosion of their main charge. They have a charge/weight ratio of about 45%, and are not intended for use as armor- or concrete-piercing bombs.

The two sizes of bombs are identical in all respects, the 22,000-lb. D.P. being merely an enlarged version of the 12,000-lb. D.P. A rather unusual feature of these bombs is the use of a cowl between the bomb body and the tail assembly to enhance their streamlining. Both D.P. bombs are tail fuzed only, each bomb using three Tail Pistols No. 58 located 120 degrees apart in the base plate.

These bombs have been adapted by the U. S. for service use after slight modifications in the method of construction.

D.P. 12,000-lb. Mk I, "Tallboy", (Service)

Data

Fuzing.....Three Tail Pistols No. 58 Mk I
Color markings....Green over-all; red band near nose
Tail No. .....No. 78 Mk I
Over-all length .....21 ft.
Body diameter.....3 ft. 2 in.
Body length.....10 ft. 4 in.
Wall thickness.....Near tail, 1.25 in.; near nose, 4.1 in.
Tail length.....10 ft. 8 in.
Tail width.....3 ft. 6 in. (across fins)
Total weight .....11,885 lb.
Charge/weight ratio .....45% (approx.)

Body Construction: The bomb body is manufactured of cast steel, with a solid nose plug, and with three exploders fitted 120° apart in the base plate. The bombs are issued with exploders inserted, and the exploder tubes are sealed with shipping plugs.

The tail is attached to the after end of the bomb body by 12 studs. A cylindrical metal cowling, placed between the bomb body and the tail cone, enhances the streamlining of the bomb.

The bomb body contains an explosive filling of Torpex with a one-inch layer of TNT topping added to the after end. Four inches of woodmeal/wax composition is then added, and the filling sealed with a ½-in. plyboard washer. The three exploders pass through holes in this washer and are held in place by a heavy base plate, which is secured by bolts to the bomb body.

Tail Construction: The special tail unit, No. 78 Mk I, is constructed of light alloy and consists of a cone to which are attached four fins of streamlined cross-section. The fins are set at an angle of 5° to the axis of the tail cone, giving a slight right-hand spin to the bomb as it falls. The tail fits over twelve 7/16-in. studs fitted into the bomb body, and is securely fastened to the studs by Simmonds nuts. Three hand-holes in the tail cone give ready access to the three tail pistols.

Suspension: The bomb is suspended in the plane by twin suspension links. Each link is coupled beneath the bomb by a special Vickers release clip, capable of either electrical or manual operation.

In addition to the suspension links, the bomb is positioned in the plane by a standard crutching system.

Explosive Components

Detonators—Sensitive type, delays up to 60 min. as required operationally.

Exploders

Primary: 2 ring and 2 solid C.E. pellets; 4 solid RDX/Beeswax pellets

Secondary: 2 ring and 2 solid large RDX/Beeswax pellets (placed in a special

exploder tube into which the standard exploder container fits).

Filling—Approximately 5,200 lb. Torpex surmounted by a 1-in. topping of TNT.

Remarks: This bomb is designed for special operational uses, and its employment will be restricted to certain specified bomb commands. The initials "D.P." signify its deep penetration characteristics, although the bomb is not designed for armor or concrete piercing. Rather, it is intended to produce heavy shock waves as a result of the explosion of its heavy main charge deep within the earth.

The bomb is carried on specially adapted Lancaster aircraft. The striking velocity of the bomb, when released at an altitude of 18,000 ft. and an air speed of 200 m.p.h., is stated at 1,097 ft./sec., at which speed it has developed a rotational velocity of 300 r.p.m.

The filling and exploder system of this bomb is identical to that of the 22,000-lb. D.P. Bomb, "Grand Slam." The two bombs are identical in all respects, the 22,000-lb. D.P. being merely an enlarged version of the 12,000-lb. D.P. Bomb.

D.P. 22,000-lb. Mk I, "Grand Slam", (Service)

Data

Fuzing	Three Tail Pistols No. 58 Mk I
Color markings	Green over-all; red band near nose
Tail No.	No. 82 Mk I
Over-all length	25 ft. 5 in.
Body diameter	3 ft. 10 in.
Body length	12 ft. 6 in.
Wall thickness	near tail, 1.75 in.; near nose, 7.75 in.
Tail length	13 ft. 4 in.
Tail width	4 ft. 4 in. (across fins)
Total weight	22,400 lb.
Charge/weight ratio	42% (approx.)

Body Construction: The bomb body is manufactured of cast steel, with a solid nose plug and with three exploders fitted 120° apart in the base plate. The bomb bodies are issued with exploders inserted, and the exploder tubes are sealed with shipping plugs.

The tail is attached to the after end of the bomb body by 12 studs. A cylindrical metal cowling, placed between the bomb body and the tail cone, enhances the streamlining of the bomb.

The bomb contains an explosive filling of Torpex, with a one-inch layer of TNT topping added to the after end. Four inches of woodmeal/wax composition is then added, and the filling sealed with a ½-in. plyboard washer. The three exploders pass through holes in this washer and are held in place by a heavy base plate, which is secured by bolts to the bomb body.

Tail Construction: The special tail unit, No. 82 Mk I, is constructed of light alloy and consists of a cone to which are attached four fins of streamlined cross-section. The fins are set at an angle of 5° to the axis of the tail cone, giving a right-hand spin to the bomb as it falls. The tail fits over twelve 7/16-in. studs fitted into the bomb body, and is securely fastened to the studs by Simmonds nuts. Three handholes in the tail cone give ready access to the three tail pistols.

Suspension: The bomb is suspended in the plane by twin suspension links. Each link is coupled beneath the bomb by a special Vickers release clip, capable of either electrical or manual operation. In addition to the suspension links, the bomb is positioned in the plane by a standard crutching system.

Explosive Components

Detonators—Sensitive Type, delays up to 60 min. as required operationally.

Exploders

Primary: 2 ring and 2 solid C.E. pellets; 4 solid RDX/Beeswax pellets

Secondary: 2 ring and 2 solid large RDX/Beeswax pellets (placed in a special exploder tube into which the standard exploder container fits).

Filling—Approximately 9,200 lb. Torpex surmounted by a 1-in. topping of TNT.

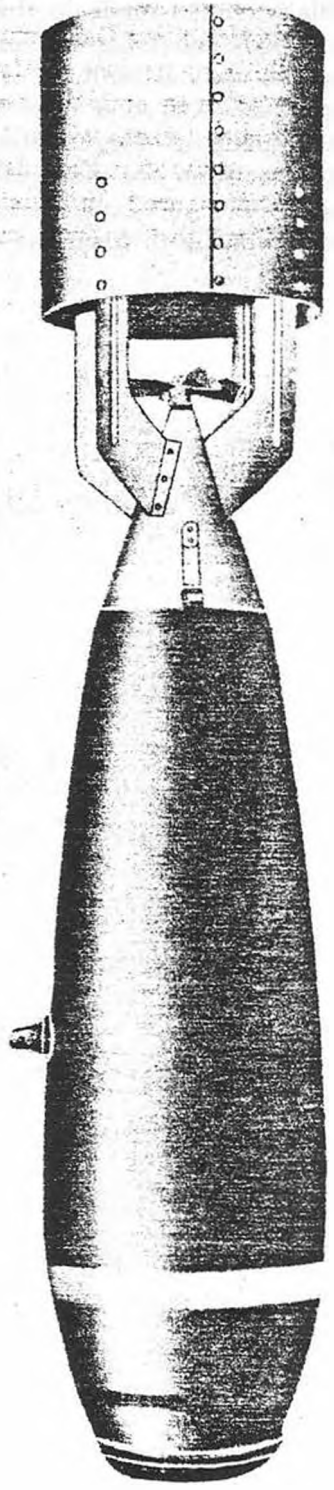
Remarks: This bomb is designed for special operational uses, and its employment will be restricted to certain specified bomb commands. The initials "D.P." signify its deep penetration characteristics, although the bomb is not designed for armor or concrete piercing. Rather it is intended to produce heavy shock waves as

a result of the explosion of its main charge deep within the earth.

The bomb is carried on specially adapted Lancaster aircraft. The striking velocity of the bomb, when released at an altitude of 16,000 ft. and an air speed of 200 m.p.h., is stated at 1,097 ft./sec., at which speed it has developed a rotational velocity of 60 r.p.m.

The general arrangement of this bomb is identical to that of the 12,000-lb. D.P. Bomb "Tallboy." The two bombs are identical in all respects, the 22,000-lb D.P. being merely an enlarged version of the 12,000-lb. D.P. bomb.

Grand Slam bombs made in the U. S. differ somewhat in body construction from those made in Britain. The body is built up of five sections welded together. The solid nose and the base sections are made of forged steel, while the three center sections are made of rolled plate, longitudinally welded, taper-bored internally, and then set in a die to form the external contours.



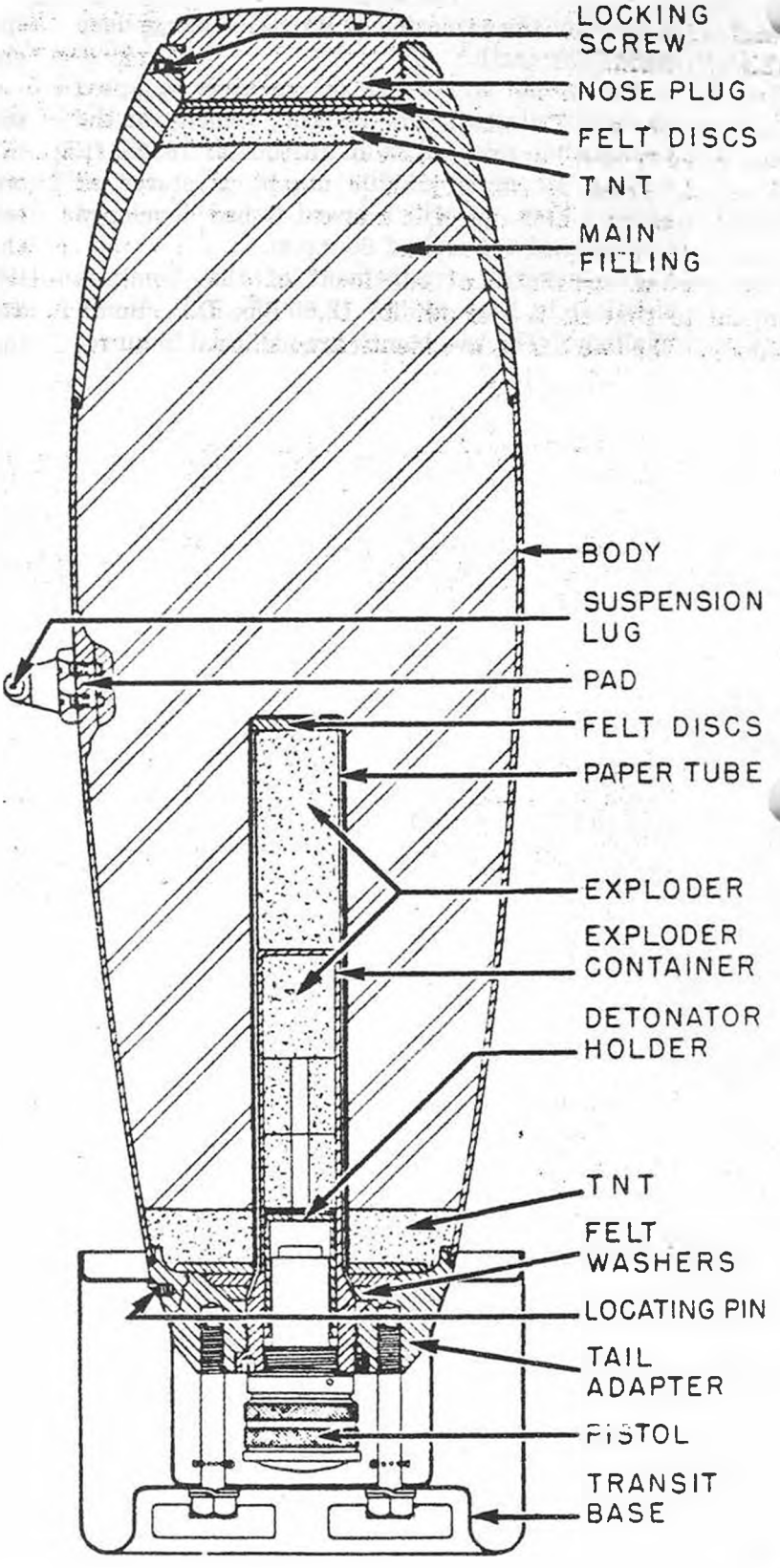


Figure 29—A.S. 100-lb. Bomb Mk IV

Part I—Chapter 8

ANTISUBMARINE BOMBS

Introduction

A.S. bombs, ranging from 100 to 600 lb., are at present in service use. They are thin-walled bombs, having a high charge/weight ratio for maximum blast effect on, or under, water. Aircraft depth charges are used by the British as alternatives for these bombs.

Earlier marks of the 100-, 250-, and 500-lb. bombs employed a Nose Fuze No. 32, but later marks incorporate a pistol/detonator combination at the tail only. The 600-lb. bomb uses a tail fuze.

These bombs are painted green over-all, and may be filled with Torpex, TNT, or Minol. Their charge/weight ratio is from 50 to 80 per cent, depending on the individual bomb and the filling. The 100-, 250-, and 500-lb. bombs are streamlined in shape.

A.S. 100-lb. Mks I-IV (Obsolescent), and Mk VI (Service)

Data

Fuzing....Mks I-III, Nose Fuze No. 32; Mk IV, Tail Pistol No. 28 or No. 30; Mk VI, Tail Pistol No. 30, or Tail Fuzes No. 875 or No. 895
Color markings.....Dark green over-all; ½-in. red band 1 in. from nose; 1-in. light green band 4 in. from nose.
Tail No.....Mk IV, No. 7 Mk I; Mk VI, No. 56 Mk I
Over-all length....42 in. (Mk VI is several inches longer with nose attachment.)
Body length .....Mks I-III, 31 in.
Mks IV-VI, 24.08 in.
Body diameter .....8.05 in.
Wall thickness .....0.11 in.
Tail length .....18 in.
Tail width .....8 in.
Total weight .....98 lb.
Charge/weight ratio .....45% (approx.)

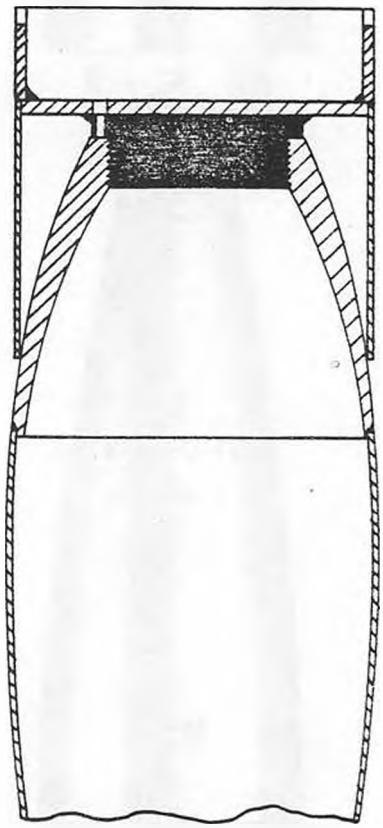


Figure 30—Nose of A.S. 100-lb. Bomb Mk VI

Body Construction: The Mk IV body consists of a hollow nose forging or casting, and a cast or forged tail adapter, welded to a sheet steel casing. The hollow nose is threaded to take a solid, flat nose plug, which is secured by a locking screw. The casing is made of two parts, welded together longitudinally. The tail adapter receives the exploder container, which is locked and sealed in position, and houses the detonator holder and pistol.

The Mk III body has a nose fitted with a nose fuze adapter, three internal strengthening rings, and a tail adapter. A ballistic cap screws onto the nose to prevent ricochet.

In the Mk VI body, the nose plug and a cup shaped nose attachment are welded on.

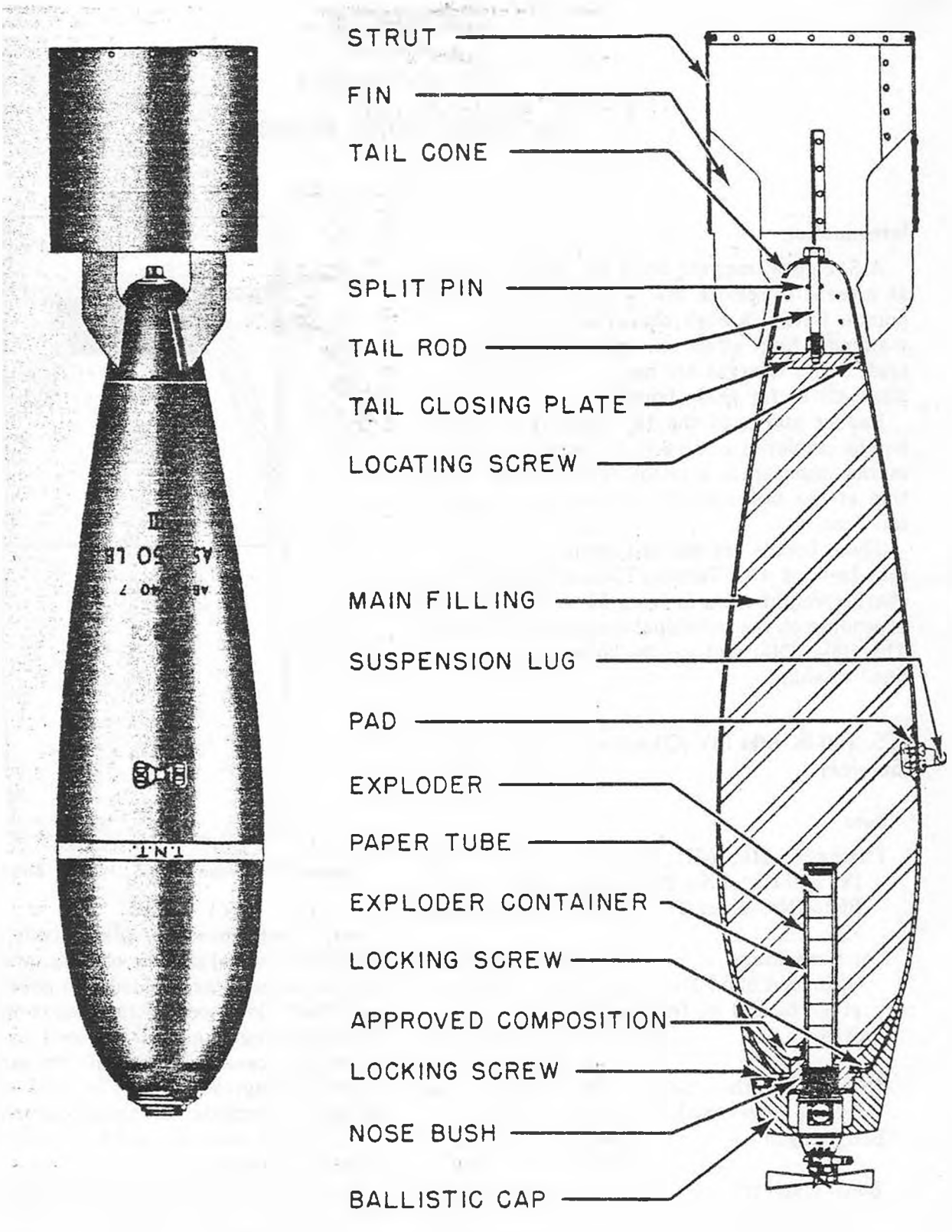


Figure 31—A.S. 250-lb. Bomb Mk III

Tail Construction: The Bomb Mk IV uses a Tail Assembly No. 7 Mk I which consists of a sheet-metal tail cone with a cylindrical strut attached by four fins. It is secured to the tail adapter by four spring clips on the cone. The tail assembly also has a reach rod, with arming vanes on after end, which extends through the tail cone to engage the arming fork of the tail pistol.

The tail of the Bomb Mk III consists of a cylindrical strut, attached by fins to a dome, which is secured to the bomb by a central bolt.

The Bomb Mk VI uses a Tail No. 56 Mk I, which is secured by four locking screws threaded through four cone-securing bosses welded on at an angle to tail cone. The screws thread inward and aft to engage slots in the bomb body.

Suspension: The bomb is horizontally suspended by a single lug, which is secured by screws projecting through the case and into a steel-block support pad welded to the interior of the body.

Explosive Components

Detonators—(See Part 2, chap. 4, Detonators.)

Exploders—C.E.

Filling—Mk IV, 45 lb. RDX/TNT 60/40 or 44 lb. TNT; Mk VI, 49 lb. Torpex (When filled with Torpex, a topping of TNT is added at the nose and base.)

Remarks: The Tail Pistol No. 30 with needle striker is to be used in the Bomb Mk IV for A/S bombing. The Pistol No. 28 can be used in place of the No. 30 for land bombardment.

The Bomb Mk V was never produced.

A.S. 250-lb. Mks I, II, and III (Obsolescent) and Mk IV (Service)

Data

Fuzing....Mks I–III, Nose Fuze No. 32; Mk IV, Tail Pistol No. 28 or No. 30
Color markings.....Dark green over-all; ½-in. red band 1 in. from nose; 1-in. light green band 4½ in. from nose
Tail No.....Mk IV—No. 8 Mk I
Over-all length .....Mk III, 59 in.; Mk IV, 58 in.
Body length .....Mk III, 42 in.; Mk IV, 35.2 in.
Body diameter .....Mk IV, 11.35 in.; Mk III, 11.2 in.
Wall thickness .....Mks III and IV, 0.14 in.; Mks I and II, 0.125 in.
Tail length .....Mk IV, 23.4 in.
Tail width .....11.0 in.
Total weight.....Mk IV, 243 lb.
Charge/weight ratio.....Mk IV, 55%

Body Construction: The Mk IV body consists of a hollow nose forging or casting and a cast or forged tail adapter, welded to a sheet-steel casing. The hollow, flat nose is threaded to take a solid nose plug which is secured by a locking screw. The casing is made of two parts, welded together longitudinally. The tail adapter receives the exploder container, which is locked and sealed in position, and houses the detonator holder and pistol.

The Mk I–III bodies have the nose fitted with an adapter for a nose fuze. Internal strengthening bands are welded to the body, which has no tail adapter. A ballistic cap screws on the nose to prevent ricochet.

Tail Construction: In the Bomb Mk IV, the tail assembly consists of a sheet-metal cone with a cylindrical strut attached to it by four fins. The assembly is secured to the tail adapter by four spring clips on the cone. A reach rod, with arming vanes attached to after end, extends through the cone and engages the arming fork of the tail pistol.

The tails of the Bombs Mk I–III consist of a cylindrical strut attached by four fins to a dome-shaped tail cone, and secured to the bomb by a central bolt.

Suspension: The bomb is horizontally suspended by a single lug, secured by screws projecting through the case and into a steel-block support pad welded to the interior of the body.

Explosive Components

Detonators—(See Part 2, chap. 4, Detonators.)

Exploders—C.E. pellets. (Early marks had C.E. and TNT.)

Filling—Mk IV, 134 lb. RDX/TNT or 132 lb. TNT (when RDX/TNT is used, bomb has ½-in. nose topping and 1-in. base topping of TNT); Mk III, 149 lb. Baratol or 140 lb. TNT.

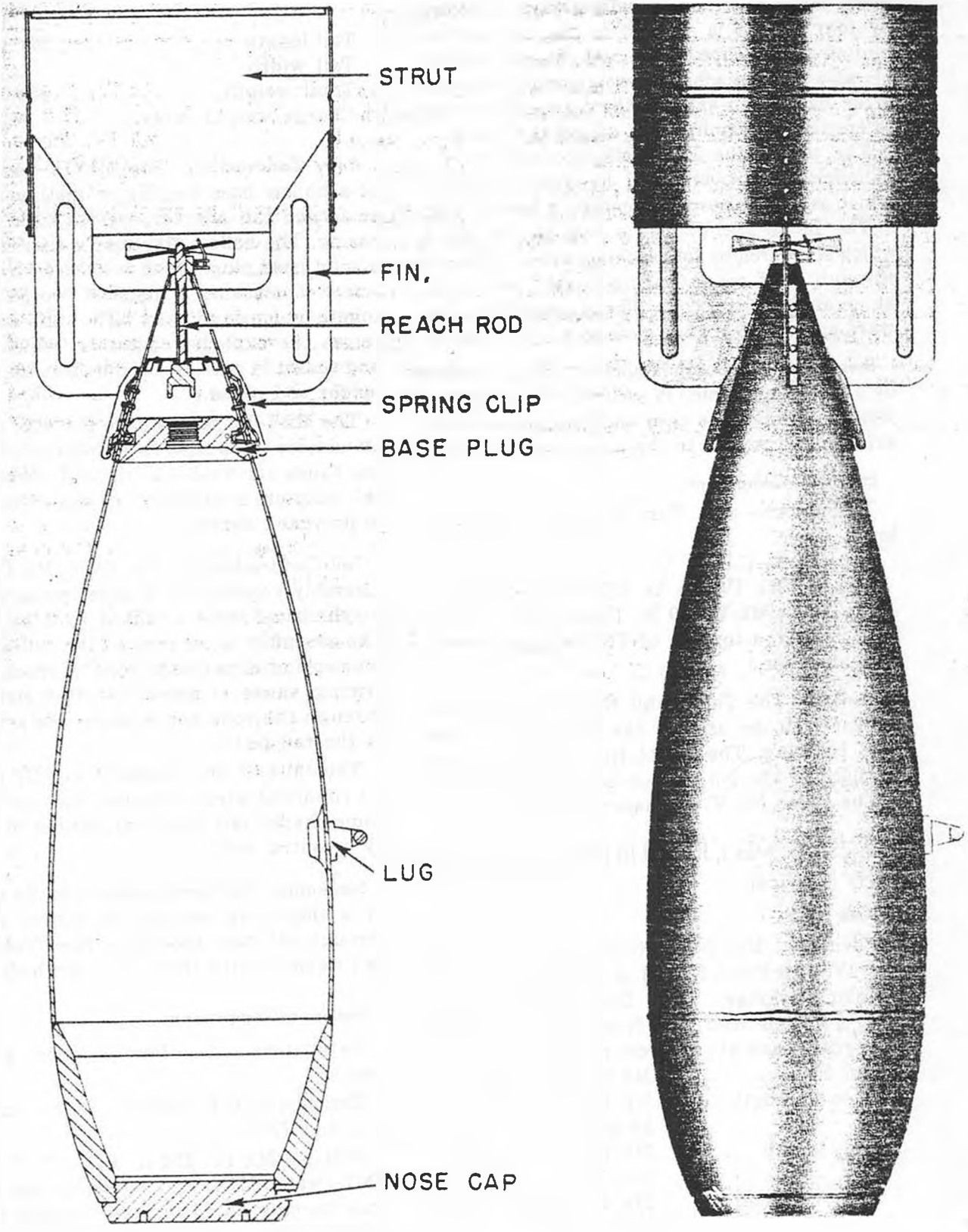


Figure 32—A.S. 500-lb. Bomb Mk IV

Remarks: These bombs are designed to give maximum blast effect for use against submarines. The Tail Pistol No. 30 with a needle striker is to be used in the Bombs Mk IV for A/S bombing. The Pistol No. 28 can be used in place of the No. 30 for land bombardment.

A.S. 500-lb. Mks I-IV (Obsolescent)

Data

Fuzing....Mks I–III, Nose Fuze No. 32; Mk IV, Tail Pistol No. 28 or No. 30
Color markings.....Dark green over-all; ½-in. red band 1 in. from nose; 1-in. light green band 6 in. from nose
Tail No.....Mk IV, No. 9 Mk I
Over-all length .....Mks I and II, 74.0 in.; Mk III, 76.0 in.; Mk IV, 72.5 in.
Body length .....Mks I, II and III, 53 in.; Mk IV, 50 in.
Body diameter .....Mks I and II, 14.0 in.; Mks III and IV, 14.3 in.
Wall thickness .....Mks I and II, 0.16 in.; Mks III and IV, 0.18 in.
Tail length.....Mk IV, 24.2 in.
Tail width.....Mk IV, 14 in.
Total weight.....Mk IV, 490 lb.
Charge/weight ratio.....Mk III, 62-64%; Mk IV, 58%

Body Construction: The Mk IV body consists of a hollow nose forging or casting, and a cast or forged tail adapter, welded to a sheet-steel casing. The nose is threaded to take a solid nose plug, which is secured by a locking screw. The casting is made in two parts, welded together longitudinally. The tail adapter receives the exploder container, which is locked and sealed in position, and houses the detonator holder and pistol.

The Mks I–III bodies have the nose of the bomb fitted with an adapter for a nose fuze. Internal strengthening bands are welded to the body, which has no tail adapter. A ballistic cap screws on the nose to prevent ricochet.

Tail Construction: The Tail Assembly No. 9 Mk I consists of a sheet-metal cone with a cylindrical strut attached to it by four fins. The assembly is secured to the tail adapter by four spring clips on the cone. A reach rod, with arming vanes attached to the after end, extends through the cone and engages the arming fork of the tail pistol.

The tails of the Bombs Mks I–III consists of a cylindrical strut attached by four fins to a dome-shaped tail cone, and secured to the body by a central bolt.

Suspension: The bomb is horizontally suspended by a single lug, secured by screws projecting through the case and into a steel-block support pad welded to the interior of the body.

Explosive Components

Detonators—(See Part 2, chap. 4, Detonators.)

Exploders—C.E. pellets. (Earlier bombs had C.E. and TNT.)

Filling—Mk IV, 282 lb. TNT, or may be filled with RDX/TNT (when RDX/TNT is used, bomb has ½-in. nose topping and 1-in. base topping of TNT); Mk III, 291 lb. TNT or 308 lb. Baratol 10/90.

Remarks: These bombs are designed to give maximum blast effect for use against submarines. The Tail Pistol No. 30 with needle striker is to be used in the Bombs Mk IV for A/S bombing. The Pistol No. 28 can be used in place of the No. 30 for land bombardment.

A.S. 600-lb. Mk I (Service)

Data

Fuzing.....Tail Fuze No. 862
Color markings.....Dark green over-all; ½-in. red band and 1-in. light green band around body
Tail No.....No. 36 Mk I
Over-all length .....56.7 in.
Body length....36 in. (without nose attachment)
Body diameter .....17.5 in.
Wall thickness .....0.125 in.
Tail length .....20.5 in.
Tail width .....17.5 in.
Total weight .....550 lb.
Charge/weight ratio .....80% (approx.)

Body Construction: The body consists of three pieces welded together; a concave nose, parallel sides, and a tapered base to receive the clip-on tail. The after end is closed off by the closing plate, which houses the exploder container. A

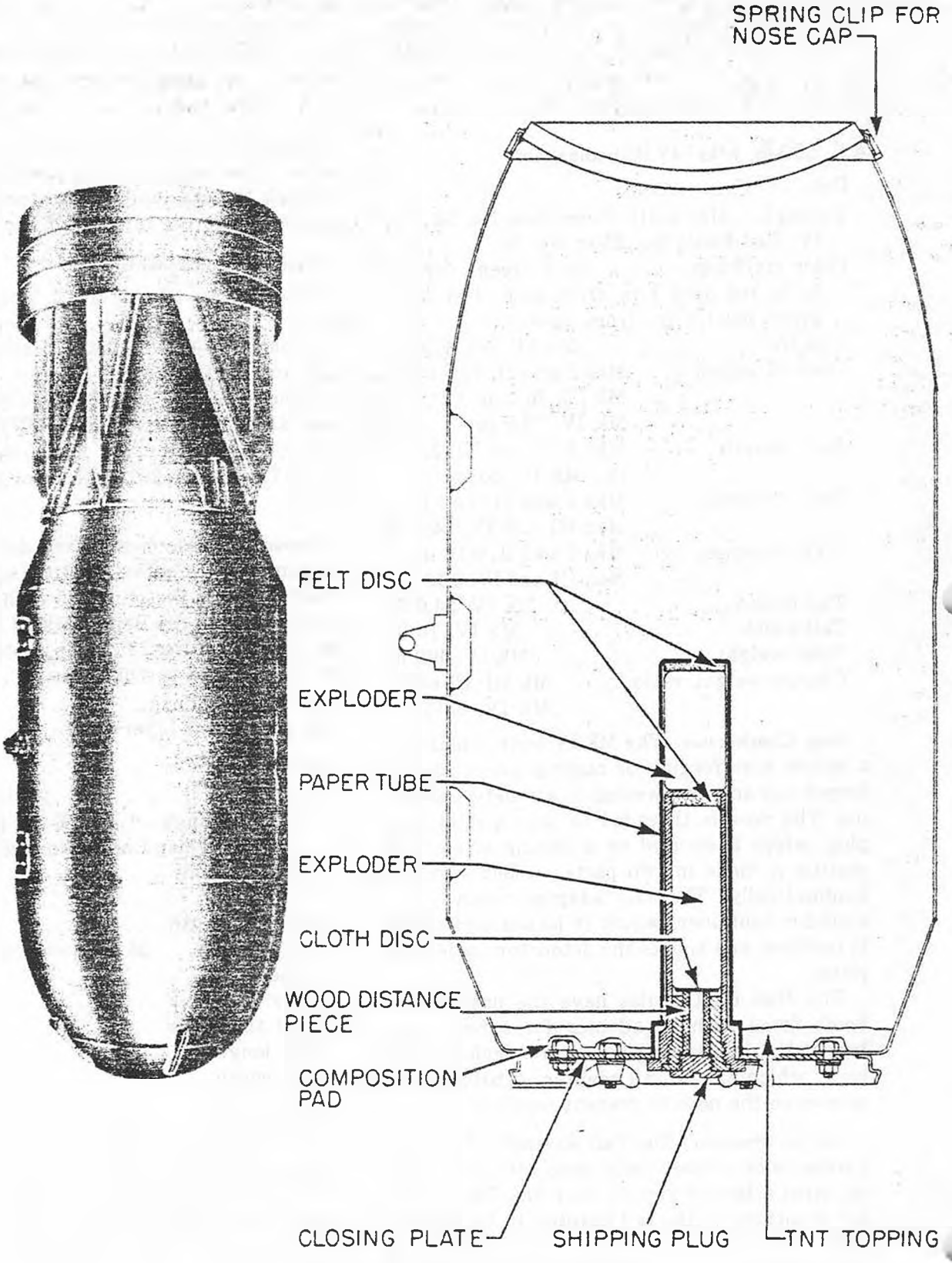


Figure 33—A.S. 600-lb. Bomb Mk I

round nose cap, attached to the nose for streamlining during air travel, breaks off on impact, giving the bomb an unstable trajectory, and so preventing ricochet.

Tail Construction: The clip-on type tail consists of a cylindrical strut secured to the tail cone by four fins. The tail cone is constructed of four pieces and is held together by three rivets only. There is no reach rod extending through the tail cone, as the fuze is not the arming-vane type. The tail breaks off on impact with water, contributing to the unstable trajectory of the bomb.

Suspension: The bomb may be suspended from British planes by the single lug, or from U. S. aircraft by the dual lugs on either side of the single lug. When either dual lugs or the single lug are used, the remaining lug screw holes are closed by transit screws.

Explosive Components

Exploder—C.E.

Filling—432 lb. of Minol II or 439 lb. Torpex. (½-in. layer of TNT at base when filled with Minol or Torpex)

Remarks: The fuze is fitted in an anticountermining chamber.

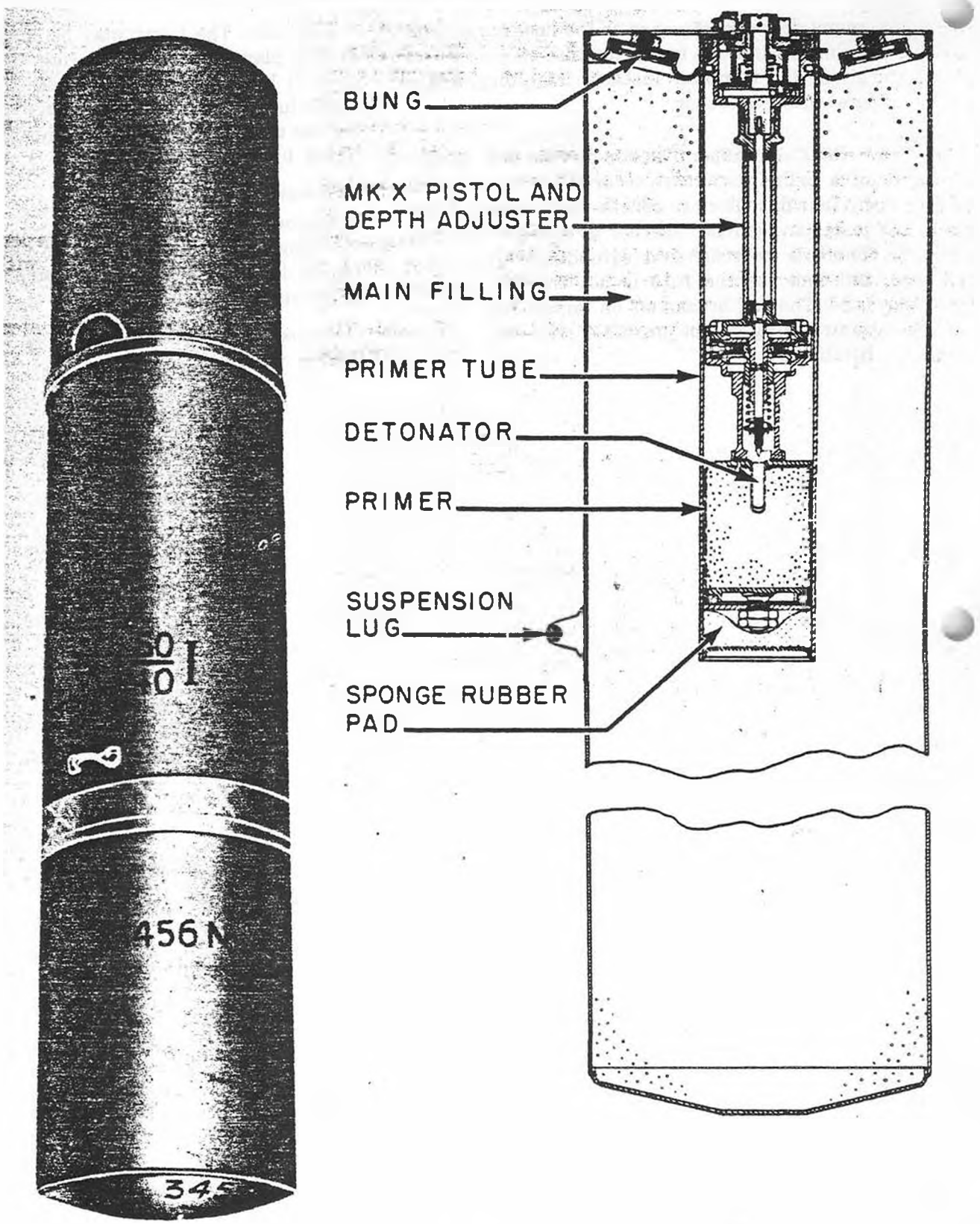


Figure 34—D.C. 250-lb. Bomb Mk VIII

Part I—Chapter 9

AIRCRAFT DEPTH CHARGES

Introduction

The depth charges included in this section are those dropped from aircraft in antisubmarine warfare. Only one size, the 250-pound, is currently in use. They are normally carried on a bomb carrier.

These bombs consist of a cylindrical metal case, with an explosive charge, and have a central tube in which are housed a primer, a detonator, and a tail pistol when the depth charge is ready for use. The depth at which the depth charge will detonate is determined by the pistol, which operates by hydrostatic pressure. A safety device is incorporated to render the depth charge safe in the event of the carrying aircraft's sinking after a forced landing. This safety device, however, does not always prevent detonation if the depth charge is dropped safe, as it may be affected by impact with the water.

Aircraft depth charges are thin-walled, with a loading factor of about 65 per cent. They are painted dark green over-all, with a red band, and a colored band to indicate the nature of the explosive filling. Attachments, comprising a nose fairing and/or a tail, are usually fitted to a depth charge to reduce the air resistance when carried externally on an aircraft, and to increase the stability of the air trajectory. Unless fitted with a parachute, failure to detonate may result if the depth charge is dropped from too great a height or at too great a speed.

D.C. 250-lb. Mk VIII (Obsolescent)

Data

Fuzing....Hydrostatic Tail Pistols Mks XIV, XIV*, XVI, XVI*, or Mk X**
Color markings.....Dark green over-all; ½-in. red band near nose; 2-in. light green cross-hatched band near suspension lug
Over-all length .....56 in.
Body length .....38.15 in.
Body diameter .....11 in.
Tail length .....18 in.
Tail width .....11 in.
Total weight .....250 lb.
Charge/weight ratio 64%

Body Construction: The body consists of a welded cylindrical outer case to which a convex nose is welded. The bomb is sometimes fitted with a concave nose attachment. The rear end of the body is closed by an end cover dished inwards, which houses two filling holes that are closed by bungs. On the cover are six equispaced lugs for attaching the tail. A primer tube fits into the rear cover and extends approximately half the length of the body. It has 3.5 in. internal diameter, and contains the primer, pistol, and depth adjuster.

Tail Construction: The tail is an open-ended, cylindrical, sheet-metal tail supported internally by a spiral wire stiffener. A strengthening band on the forward end carries six brackets, which are attached by studs and nuts to the six lugs on the closing cover of the depth charge. Three equally spaced ports are provided in the tail, through one of which is passed the fuze-setting control link when the depth charge is loaded on the aircraft. The tail breaks off on impact with the water.

Suspension: The bomb employs horizontal suspension by a lug welded to the body at the center of gravity. It may be fitted with two additional lugs for suspension from U. S. aircraft bomb racks.

Explosive Components

Detonators—Mk VII, A.S.A. mixture and C.E.
Primer—Mk VIII, one solid and one perforated pellet of C.E.
Filling—160 lb. Amatol.

Remarks: This depth charge is dropped from a maximum height of 500 ft. and at a maximum speed of 173 m.p.h.

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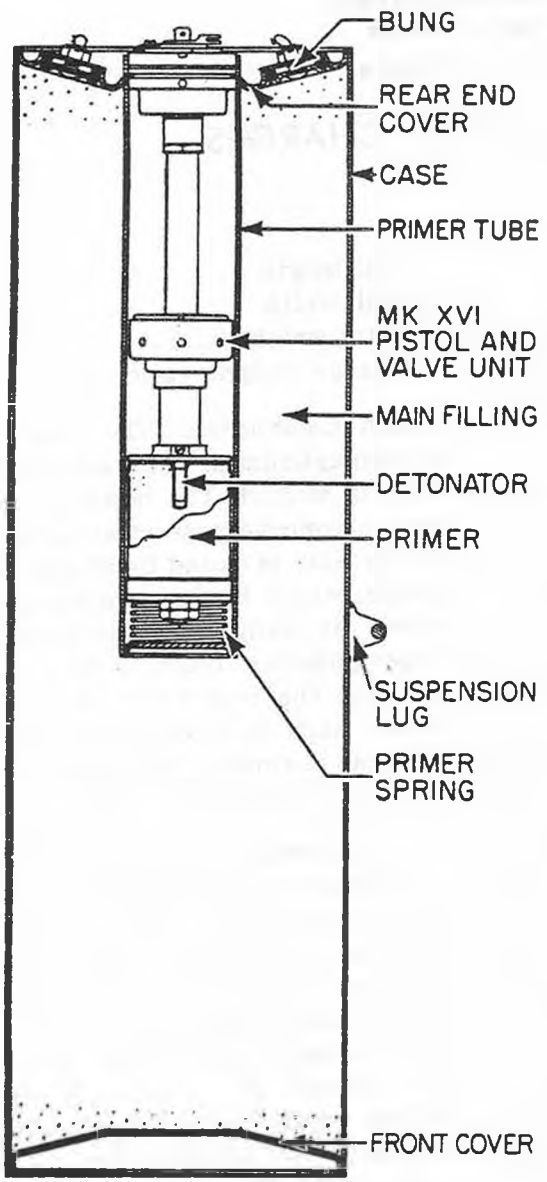


Figure 35—D.C. 250-lb. Bomb Mk XI

D.C. 250-lb. Mks XI and XI* (Service)

Data

Fuzing....Hydrostatic Tail Pistols Mk XIV, XVI, XIX, or XX
Color markings.....Dark green over-all; ½-in. red band and a colored band indicating nature of explosive painted around body in front of suspension lug
Tail No.....Mk III (Mk IV when using Pistols Mk XIX or XX)
Over-all length .....54.8 in.
Body length .....37 in.
Body diameter .....11 in.
Tail length .....17.8 in.
Tail width .....11 in.
Total weight .....265 lb.
Charge/weight ratio 66%

Body Construction: The body is a welded cylindrical case closed at each end by a cover which is welded on. The central primer tube is welded into an opening in the rear cover, and extends approximately half way through the body. Equi-spaced around the rear cover are three lugs, each drilled and tapped to receive a stud used for securing the tail to the depth charge. Two filling holes, each closed by a bung, are provided in the rear cover. The front cover is dished inward to prevent ricochet.

Tail Construction: The Tail Assembly Mk III is simply a cylindrical drum open at both ends.

A strengthening ring is welded to the front end and provided with three equi-spaced brackets, weakly riveted on, which fit over the studs in the corresponding lugs on the rear end cover of the body. The tail is strengthened by six circumferential corrugations. The tail breaks off on impact with water. The front of the tail has one large port for the fuze-setting control link, and two small ports to give access to pistol and valve unit when fitting the fuze-setting control link.

The Tail Mk IV is designed with arming vanes and a reach rod to arm Pistols Mks XIX and XX, which are of the air-arming type and are replacing the Tail Hydrostatic Pistols Mks XIV and XVI. This tail is constructed with a three-segment cone, to which are riveted three fins supporting the three-segment cylindrical strut. Three hand clearance holes are equi-spaced around the forward end of the cone.

Suspension: The Bomb Mk XI has a single lug welded to the case at the center of gravity for British aircraft. The Bomb Mk XI* has dual lugs welded to its case for suspension from U. S. aircraft.

Explosive Components

Detonators—Detonator Mk VII of A.S.A. and C.E.

Primer—Primer Mk VIII, one perforated and one solid C.E. pellet

Filling—175 lb. Torpex.

Part I—Chapter 10

BUOYANCY BOMBS

Introduction

Only the 250-lb. buoyancy bomb has been used by the British. The bomb is designed to be dropped in front of ships under way, and to rise and detonate on contact with the ship's bottom.

The bomb consists primarily of an explosive charge, a buoyancy chamber, and a clip-on tail. It is fuzed with a Tail Fuze No. 850. The bomb is painted dark gray over-all, and has a red nose band and a green band at the base of the ogive.

B. 250-lb. Mk IV (Service)

Data

Fuzing.....Tail Fuze No. 850
Color markings.....Dark grey over-all; ½-in. red band 3 in. from nose; ½-in. green band 9½ in. from nose
Tail No.....No. 23, Mk I with the Mk III body
Over-all length .....72 in.
Body length .....42 in.
Body diameter .....14.3 in.
Tail length .....28 in.
Tail width .....14.3 in.
Total weight .....250 lb. (approx.)
Charge/weight ratio .....40% (approx.)

Body Construction: The bomb consists of a truncated, cone-shaped charge case with a concave nose welded on, a buoyancy chamber secured to the charge case by twelve nuts, and a clip-on tail. A convex nose attachment can be fitted to the nose by means of three brackets, equispaced around the edge of the nose. The buoyancy chamber has twelve hand clearance pockets around the forward end to permit access to the twelve bolts securing the charge case. Internal reinforcements are spot welded to the interior forward half of the buoyancy chamber, and two circular stiffeners extend athwartships through the chamber, spot welded to the chamber wall. An exploder tube extends centrally through the buoyancy chamber and charge case. It is welded at the rear to the joint ring fitting inside the fuze pocket, and supported by the stiffening ring in the middle of the buoyancy chamber.

Tail Construction: The Tail No. 23 Mk I, used on the Mk III body, consists of a tail cone with cylindrical strut secured by four fins riveted to the strut and tack welded to the tail cone. The tail assembly is attached to the body by spring clips, and breaks free on water impact.

Functioning: On striking the water, the nose attachment is dished in and the tail breaks away. When the tail breaks away, it uncovers a wheel-shaped disc on the base of the bomb. This is the contact disc, to which are attached three chains, the opposite ends being fastened to the support ring on the bomb base. If these chains are tight, the fuze is armed as the contact disc rises during the arming process. If the bomb fails to hit a ship upon rising, it sinks after a short flotation period.

Suspension: The bomb is suspended by a single lug secured by four screws threaded into a suspension-lug stiffener, and a boss, spot welded to the interior of the buoyancy chamber.

Explosive Components

Exploders—C.E. exploders in central tube
Filling—113.2 lb. Torpex 2, with 3.25 lb. TNT topping in after end of charge case

Remarks: This bomb is designed to be dropped in front of ships under way, and to rise and detonate on contact with the ship's bottom. The concave nose portion of this bomb is designed to give better under-water ballistics, rather than a Munroe effect.

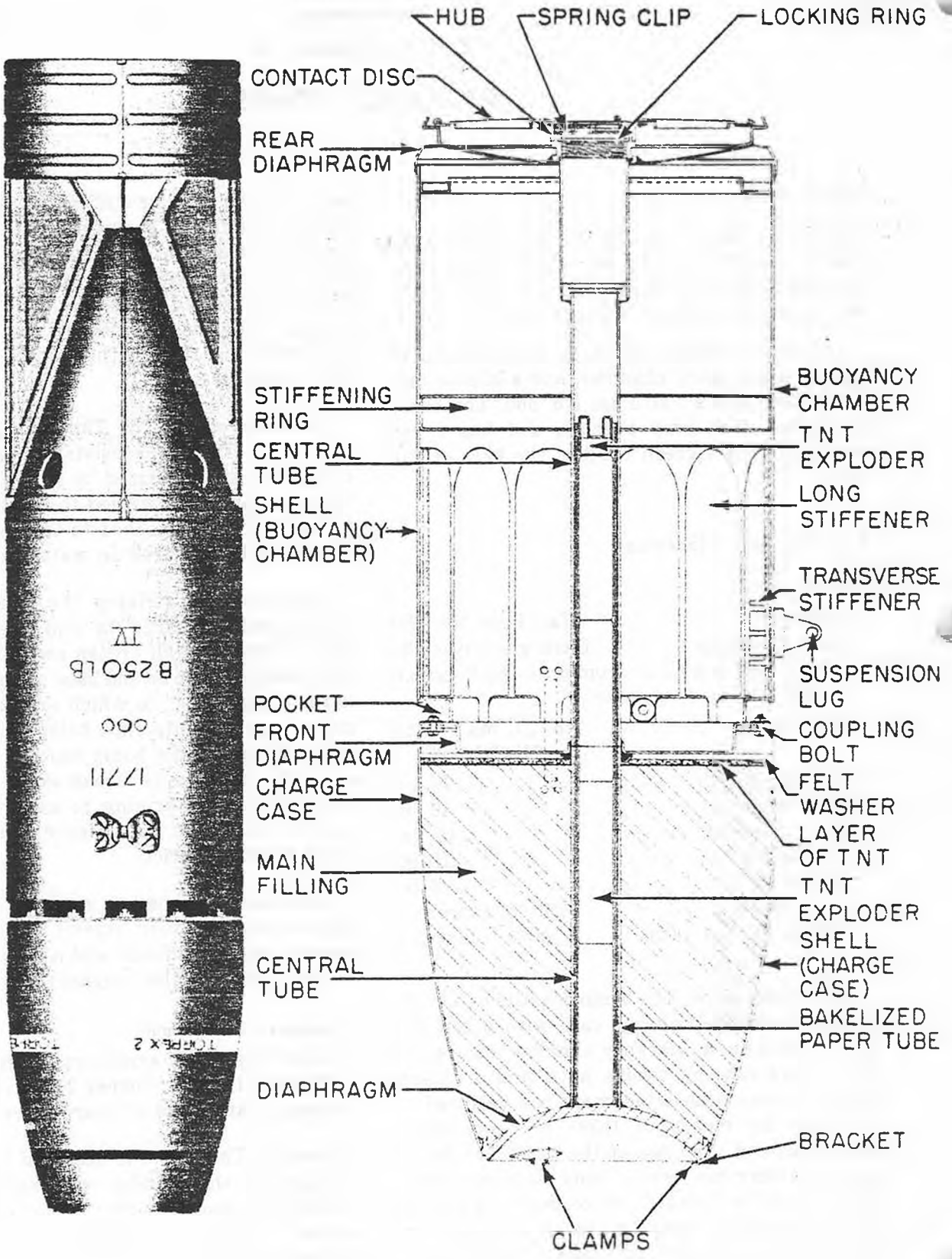


Figure 36—B. 250-lb. Bomb Mk IV

Part I—Chapter 11

INCENDIARY BOMBS

Introduction

Incendiary bombs of many various types, ranging in weight from 4 to 250 lb., are at present in service use for operations against different types of targets. The construction and filling of these bombs differ with the individual types, and no general description can be given here to cover the complete range.

Some bombs, such as the 4-lb. series, have bodies composed mainly of incendiary material, such as magnesium alloy, and are filled with solid incendiary compositions. Other bombs, such as the 30-lb. I.B., have steel tubular bodies and are liquid filled with a rubber/benzole solution, or may be partially filled with cast white phosphorus. Liquid-filled bombs are provided with an ejection charge. The obsolete 25-lb. bomb has a faired steel tubular body containing incendiary firepots which are ejected successively by small gunpowder charges.

A small percentage of 4-lb. incendiary bombs contain an explosive charge, the object of which is to render dangerous approach to the burning bombs, because of the risk of flying splinters. Attempts to extinguish these and standard non-explosive bombs, which are dropped simultaneously, are thereby discouraged. If the explosive charge is gunpowder, the bomb is distinguished by the letter "E." A tetryl (C.E.) explosive charge is indicated by the letter "X."

These bombs are either painted a dull red over-all, or have the nose end painted red for several inches. Most of them have two black bands separated by a bright red band around the nose end. Though formerly carried in the 250-lb. Small Bomb Container, Cluster Projectiles (aimable clusters) are replacing the S.B.C. as the favored method of carrying.

I.B. 4-lb. Mks I, IE, II, IIE, III, and IIIE, and 4-lb. "X" with 2- and 4-minute delays, Mk I (Obsolescent)

Data

Fuzing.....Integral simple impact striker

Color markings....Mks I-III have dull red nose, with two ½-in. black bands separated by ½-in. bright red band around nose. Mks IE-IIIE also have bright red tail base and additional ½-in. bright red band ½ in. abaft dull red nose coloring.

Over-all length .....21.4 in.

Width across flats....1.67 in. (hexagonal in shape)

Total weight .....4 lb. (approx).

Description: The Bomb Mk III consists of a hollow, magnesium-alloy body, at one end of which is a cast iron or steel nose; the body being cast onto the nose during manufacture. A magnesium-alloy tail plug, which may be of solid or open construction, is screwed into the other end of the body. Fixed to the tail plug by two drive-screws is a tin-plate tail closed by a tail cap.

The tail plug houses a striker, creep spring, ferrule having four tabs, and a brass cap holder containing a 1.7-grain detonator. When the bomb is packed in its case, movement of the striker towards the detonator is prevented by a spring-loaded safety plunger housed in a sleeve fitted into the tail plug. Two vent holes, plugged by cork inserts, are provided in the body to communicate with the space between the cap holder and the filling of the bomb. A strip of primed cambric is located in this space. The Mk IIIE is identical to the Mk III, except for a black powder exploder charge, just abaft the nose plug in the body cavity, which replaces a small quantity of the thermite filler.

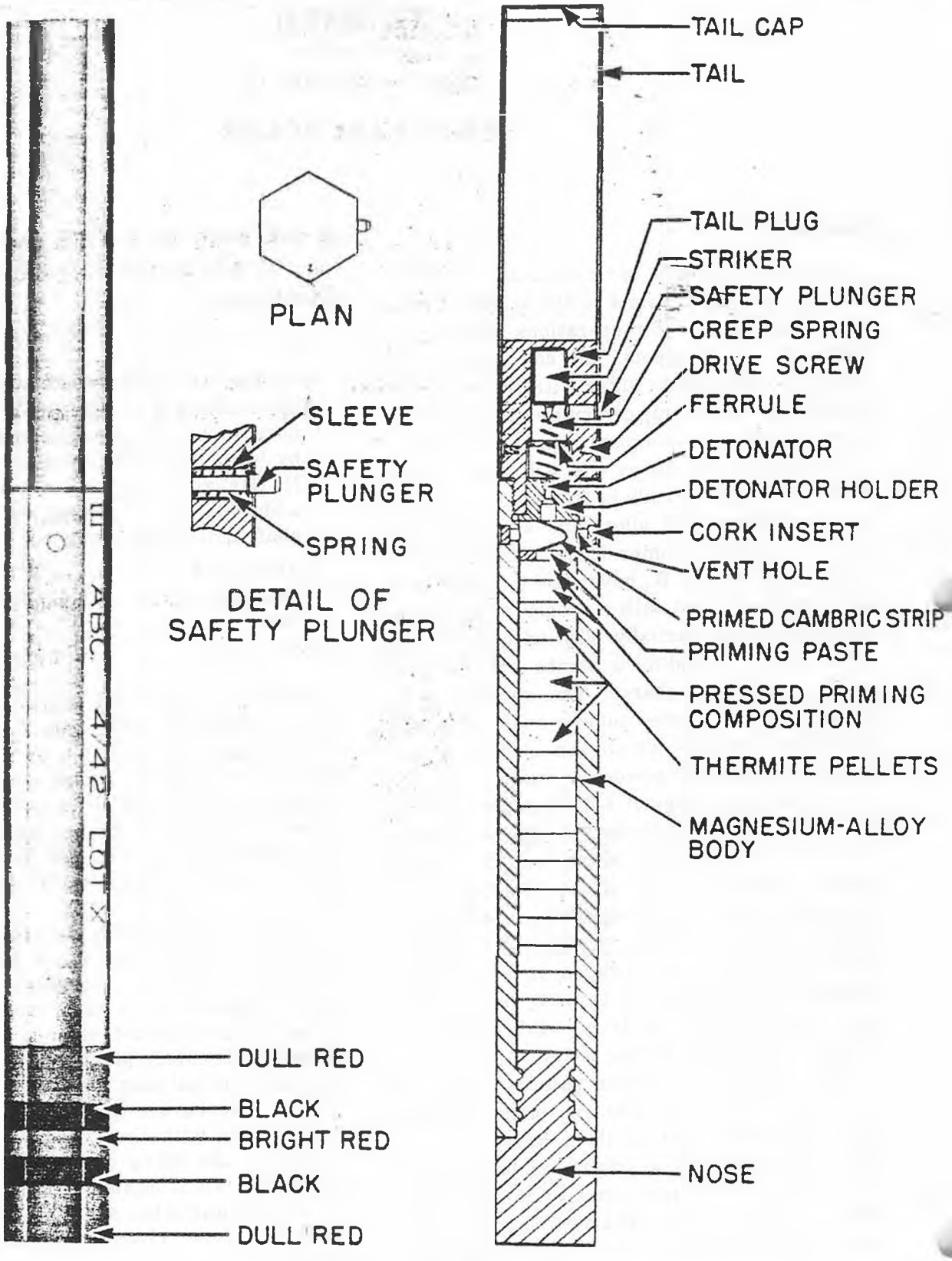


Figure 37—I.B. 4-lb. Mk III

Functioning: When the bomb is released, the safety plunger springs out. On impact, the striker overcomes the resistance of the creep spring, bends the tabs on the striker support (brass cross), and strikes and fires the detonator. The products of combustion from the detonator blow the cork inserts out of the vent holes. The flash from the detonator is conveyed by the primed cambric strip to the priming paste (gunpowder-shellac paste) on the inside of the washer, which ignites the pressed priming composition and in turn the thermite pellets. The magnesium-alloy body starts to melt about 25 sec. after the bomb is ignited, and burns for about 10 minutes. In the Bomb Mk IIIE, after 1½ to 4 minutes, the powder in the burster is ignited and explodes.

Suspension: The bombs are carried in the Small Bomb Container, or in a Cluster Projectile.

Filling: The bombs are filled with thermite incendiary pellets and the priming pellets which ignite them. The incendiary material from which the bodies are manufactured, a magnesium alloy, also contributes to the incendiary effect. The "E" bombs have an added black-powder burster charge, while the "X" bombs have a C.E. burster charge.

Remarks: The I.B. 4-lb. Mks II and IIE are similar to the Mk III and Mk IIIE, but have the following differences. The bomb bodies have a smaller bore, and the bomb bodies have four cork-plugged vent holes. The tail plugs and cap holders are of solid magnesium-alloy, and the noses are of steel.

The 4-lb. Bombs Mks I and IE are similar to the Mks II and IIE respectively, but have only a 1.62-grain detonator and are 21.4 in. long.

The 4-lb. X, with 2- and 4-minute delays, Mk I is similar in construction to the Mk III, except that a C.E. exploder is contained in the steel nose plug; this exploder being initiated after delay of either two or four minutes. The letter "X" is stamped on the outside followed by a number "2" or "4" indicating which delay is incorporated in the bomb. The marking bands are the same as on the Mk IIIE, except that the red band between the two black bands is 1 in. wide instead of ½ in., and the base of the tail is not painted red.

I.B. 4-lb. Mks IV, IVE, V, VE, and 4-lb. "X" with 2- and 4-minute delays, Mk II (Service)

Data

Fuzing.....Integral simple impact striker
Color markings....End face of nose, and body abaft nose for 2 in. painted bright red; Mk IVE has ½-in. bright red band ½-in. abaft bright red nose coloring.
Over-all length .....21.4 in.
Width across flats.....1.67 in. (hexagonal in shape)
Total weight .....4 lb. (approx.)

Description: The Bomb Mk IV is hexagonal in shape, having a hollow magnesium-alloy body, and a cast iron nose, with the body cast to the nose in manufacture. A tin-plate tail, closed by a tail cover, is secured to the other end of the body by three drive-screws, which also hold a steel striker housing in position in the body.

At the tail end, the body is counter-bored to accommodate an igniting mechanism consisting of a striker, located in the striker housing, and a steel plate seated at the bottom of the counterbore and containing a 1.7-grain detonator. One end of the striker is pointed, and the other end projects through a hole in the striker housing. The edge of this hole is chamfered to permit a thin brass cross, secured to the striker, to be bent and pulled through the hole when the bomb functions. This cross forms a striker support during transit and storage. Movement of the striker towards the detonator is, when the bomb is packed in its case, prevented by a spring-loaded safety plunger housed in a sleeve. Two vent holes, plugged by cork inserts, are provided in the tail end of the body and communicate with the space between the igniter mechanism and the bomb main filling. A strip of primed cambric is located in this space. The Mk IVE is identical to the Mk IV except for a black-powder burster charge, just abaft the nose plug in the body cavity, which replaces a small quantity of the thermite filler.

Functioning: When the bomb is released from the container, the safety plunger springs out, and, on impact with the target, the striker moves down, breaking free from the brass cross striker support and firing the detonator. The flash from the detonator ignites the primed cambric strip

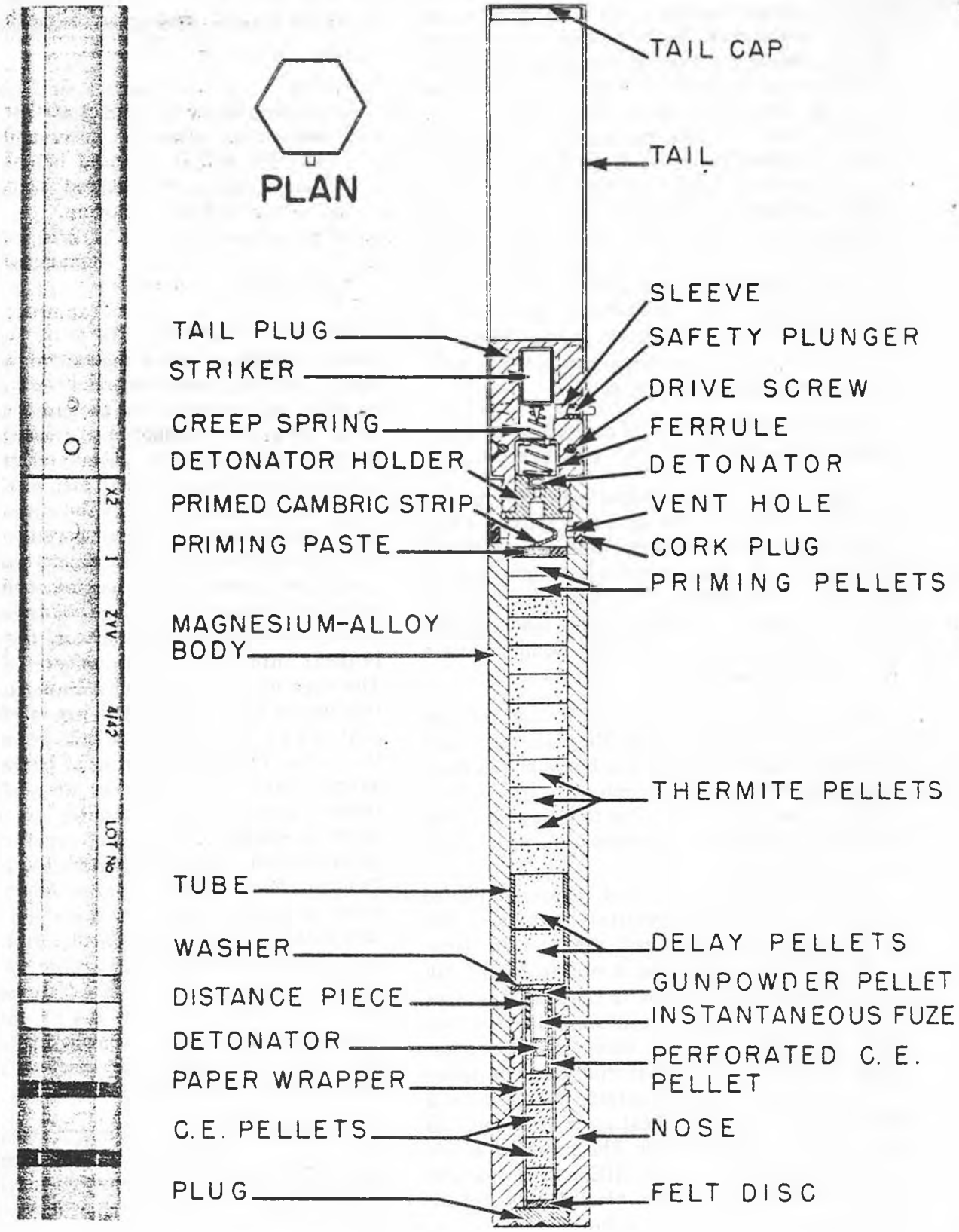


Figure 38—I.B. 4-lb. "X" with 2-minute delay, Mk I

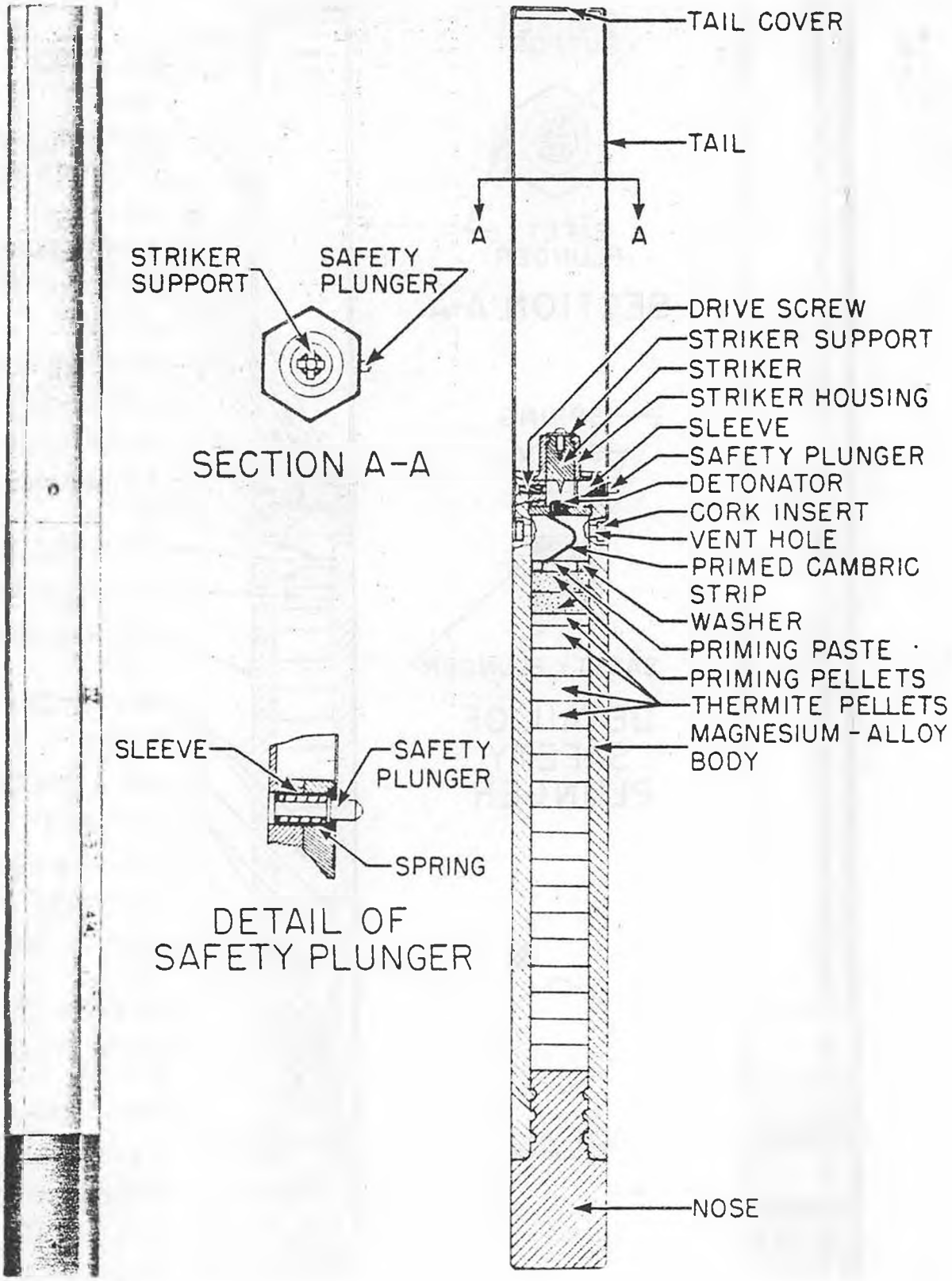


Figure 39—I.B. 4-lb. Mk IV

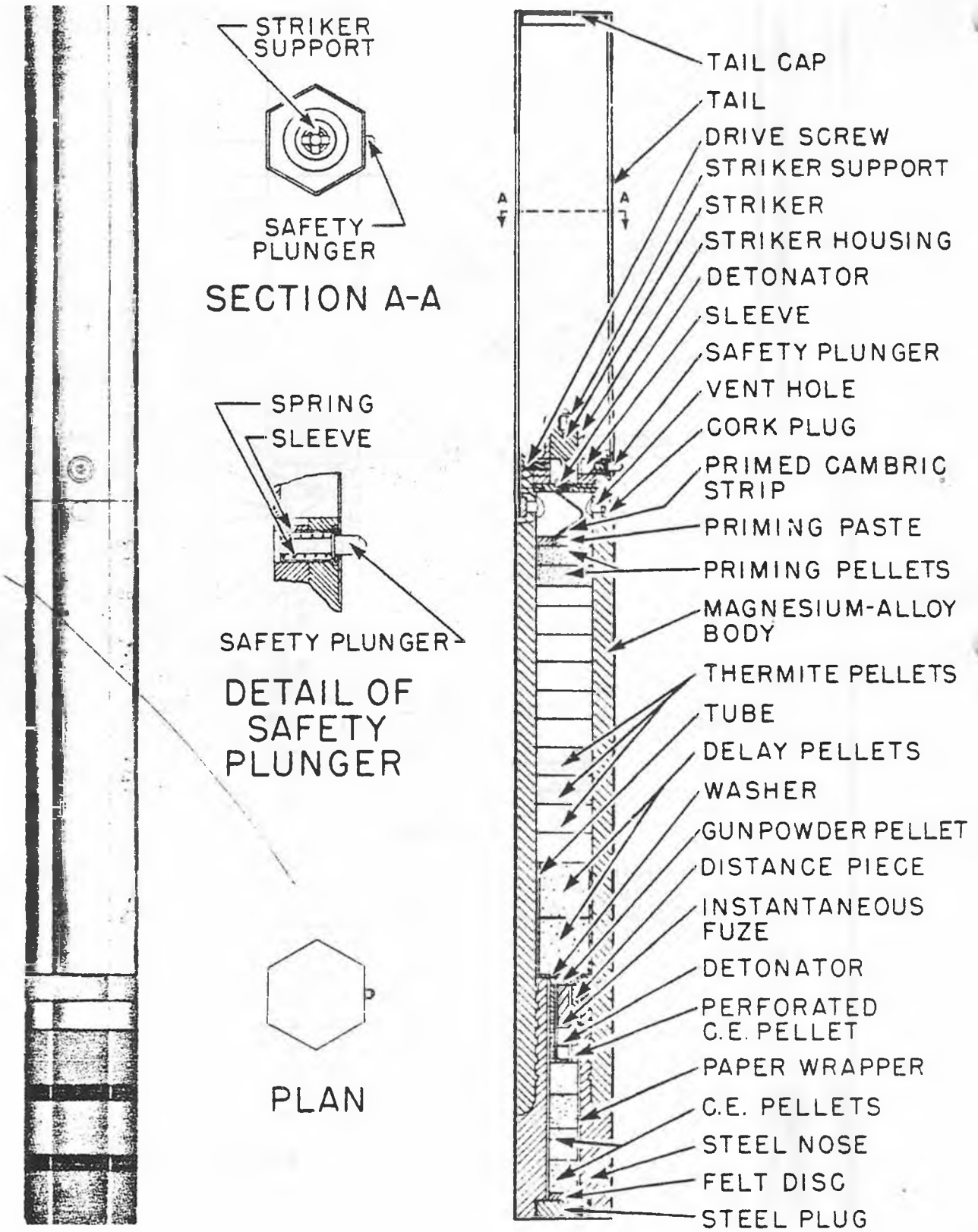


Figure 40—I.B. 4-lb. "X" with 2-minute delay, Mk II

and the priming paste (gunpowder-shellac paste), and the products of combustion blow the cork inserts out of the ventholes. The paste ignites the pressed priming composition which, in turn, ignites the thermite pellets. The magnesium-alloy body starts to melt about 25 sec. after the bomb has ignited, and burns for about 10 minutes. In the Mk IVE, after 1½ to 4 minutes, the gunpowder in the burster is ignited and explodes.

Suspension: These incendiaries are carried in the Small Bomb Container or in Cluster Projectiles.

Filling: The bombs are filled with thermite incendiary pellets and the priming pellets which ignite them. The incendiary material from which the bodies are manufactured, a magnesium alloy, also contributes to the incendiary effect. The "E" bombs have an added black-powder burster charge, while the "X" bombs have a C.E. burster charge.

Remarks: The 4-lb. Mk V and VE are similar to the Mks IV and IVE, except for the following differences. The bomb is initiated by a cap and anvil being struck by the striker, the striker having a blunt point. The cap is supported by an aluminum plate, and the striker housing is made of aluminum. A different kind of pressed priming composition is used, which is more violent than the priming compositions used in the Bomb Mk IV, and causes some of the magnesium-alloy to scatter when the bombs are ignited. This bomb is actually the U. S. AN-M 50.

The 4-lb. X, with 2- and 4-minute delays, Mk II is similar in construction to the Mk IV, except that a C.E. exploder is contained in the steel nose; this exploder being initiated after delay of either two or four minutes. The nose is painted dull red, for 3½ in., with two ½-in. black bands separated by a 1-in. bright red band painted on the nose. A second bright red band, ½ in. wide and ½ in. abaft the dull red coloring, indicates that the incendiary is of the explosive type.

No "E" marks are now produced. The small black-powder charge was not lethal, but served only as a deterrent.

I.B. 30-lb. Mks I, II, and IIM (Obsolete), and III, IIIM, IV, and IVM (Service)

Data

Fuzing	Mk I, Nose Fuze No. 38; Mks II-IV, Nose Fuze No. 846
Color markings	All marks dull red over-all; Mk I has one bright red band around nose; Mks II-III have two bright red bands, one around the nose and one around the rear of body.
Tail No.	No. 40 Mk I
Over-all length	32.7 in.
Body length	18 in.
Body diameter	5 in.
Wall thickness	0.1 in.
Tail diameter	4.7 in.
Tail length	14.2 in.
Total weight	25 lb.

Description: The bomb consists of a cylindrical body, with a hemispherical nose at one end and a tail at the other; the cylindrical tail strut being connected by four equi-spaced fins to the rear end of the tail cone.

The cylindrical body is made from welded tube, the forward end of which is reduced slightly to fit into the rim of the hemispherical steel-plate nose to which it is welded. The nose is pierced centrally and has a burster container welded into it and closed by a screwed plug, the outer surface of which conforms with the shape of the bomb nose. A flanged tail plate is welded in the rear end of the body, and has a hollow spigot through which the bomb is charged in the center. The spigot is closed by a screwed plug, and is threaded externally for the attachment of the tail. Riveted in the forward end of the tail cone is a diaphragm plate having a threaded boss, which screws onto the tail plate spigot to secure the tail to the bomb body. A 10 per cent air space is left in the body when it is filled. A 3-in. wide cylindrical strut is attached to rear of the tail cone by four fins spot welded to both strut and cone. The tail cone is closed by an end cap.

Functioning: On impact, the firing of the gunpowder in the magazine of the fuze disrupts the bomb body along the weld, and scatters the filling over a considerable area to produce a large number of fires.

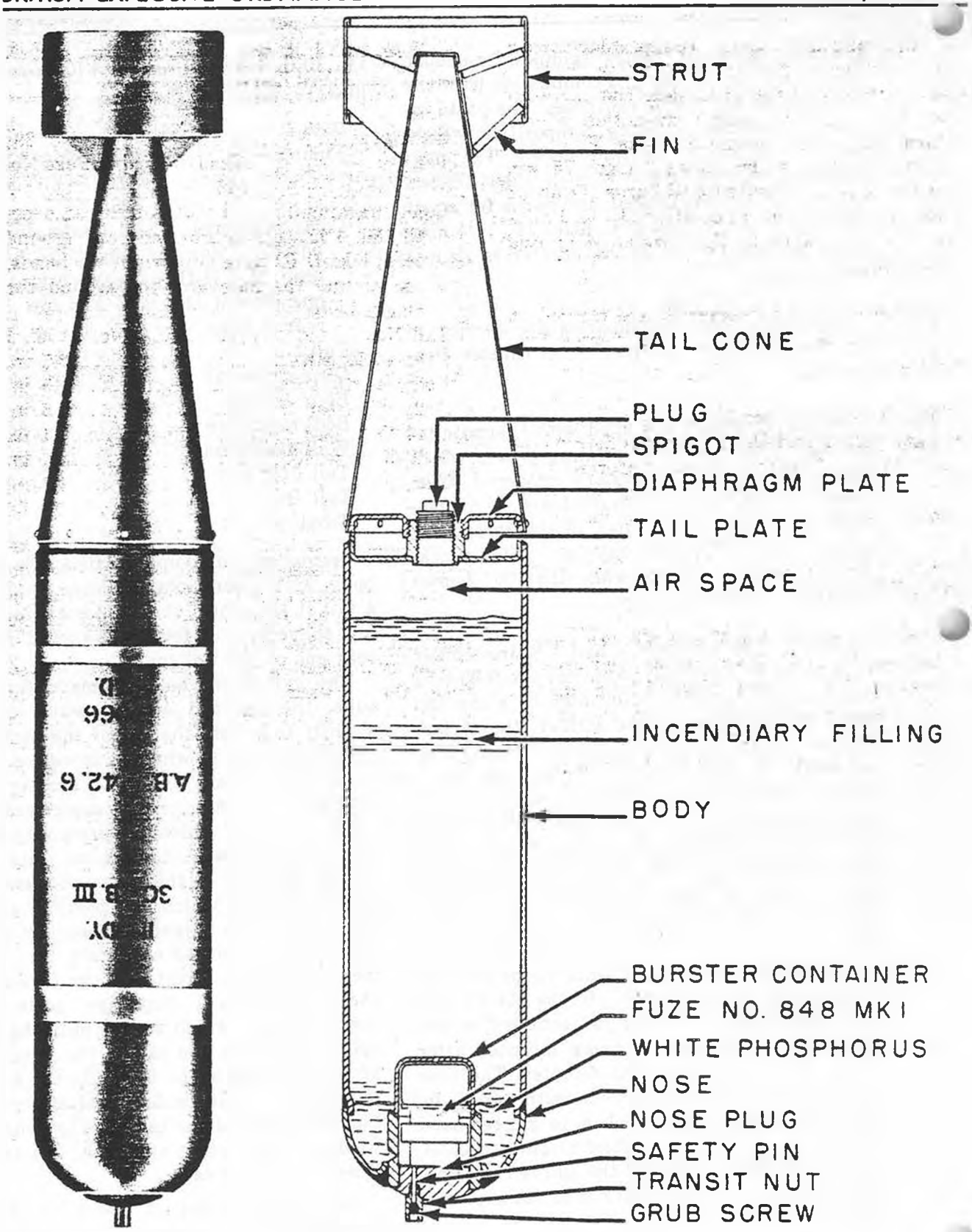


Figure 41—I.B. 30-lb. Mk III

Suspension: The bombs are carried in a Small Bomb Container, or suspended from a bomb carrier by a lug on a suspension band. S.B.C. 250# will carry eight bombs.

Filling: One pound white phosphorus, and seven pounds rubber-benzole or Perspex-benzole solution.

Remarks: The 30-lb. Bomb Mk I is similar to the Mk IV except for the following differences. The burster container is screwed and welded into a flat nose plug, which is welded into the end of the body, and a hemispherical nose fairing fits onto the nose plug. The bomb employs the Nose Fuze No. 38, and is filled with 1.5 lb. of white phosphorus cast in the nose end of the body and approximately 6 lb. of a 5 per cent solution of rubber in benzole.

The 30-lb. Bomb Mk II is similar to the Mk IV, except that the body is made from drawn tube instead of being a welded tube; so the bomb functions by tail ejection of the filling; the tail plate and tail being blown off by the firing of the magazine charge in the fuze. The weight of white phosphorus cast in nose is 1.5 lb.

The Mk III is similar to the Mk IV, except that the body is of heavier gauge metal.

The Mk IIIM is similar to the Mk III, except that body has two external pads to locate a suspension band with lug, which may or may not be used.

The Mk IIM is similar to the Mk II, except that the body has two external pads to locate a suspension band with a lug, which may or may not be used.

The Mk IVM differs from the Mk IV only in that it has a suspension band with a lug.

I.B. 30-lb., Type J, Mk I (Service)

Data

Fuzing.....Integral simple impact striker
Color markings....Dull red over-all, with two 1-in. bright red bands around body; stencilled in black on one band are letters "C.T.F.," and on other "O.C.C."
Over-all length .....21 in.
Body diameter .....5.5 in.
Total weight .....31 lb.
Wt. thermite .....1 lb.
Burning time.....1 minute (approx.)

Description: The bomb consists of a cylindrical steel body with a dished steel nose plate having a central spigot welded on, a steel ring welded to the nose plate, and a wooden nose covered by a thin metal cap and secured by screws to the ring. A tail plate is welded, near the other end of the body, and a steel central tube, projecting through the tail plate, is welded to the tail plate and the spigot on the nose plate. A magnesium-alloy striker is screwed to the central tube and retains a detonator holder in position. The striker is supported by a two-armed brass cross which engages the top of the housing. A spring-loaded safety plunger, contained in a sleeve, projects into the path of the striker. The safety plunger is held in position by a retaining sleeve, which is secured to the parasheet container.

An automatic valve is fitted to the tail plate and has an auto-valve body screwed into a socket welded into the tail plate. A tube extension, screwed into the inner end of the auto-valve body, holds a flexible tube, which extends to within three inches of the bottom of the bomb. A jet having its outlet hole pointing vertically out of the tail is screwed into the side of the auto-valve body. The valve chamber houses a spring-loaded piston having a rubber sealing disk at its inner end, which normally seals the central hole in the valve body.

The parasheet is housed in a container held in the tail end of the bomb body by six retaining screws, and its rigging lines are anchored to the container. The container is closed by a loose metal cover held in position by the end plates of the cluster projectile. A safety pin retaining sleeve, secured to the cover, is fitted into a central guide tube in the parasheet container, and houses a spring retainer in which is a compressed spring.

Functioning: As the bomb falls free of the container, the spring in the spring retainer of the parasheet container forces the cover away and releases the safety plunger, thus arming the bomb. The cover is blown aft and withdraws the parasheet. When the parasheet is fully withdrawn, the drag on the cover breaks the linen threads, so that the cover falls away.

On impact, the striker moves forward, bending the arms of the brass cross, and fires the detonator. The flash from the detonator passes

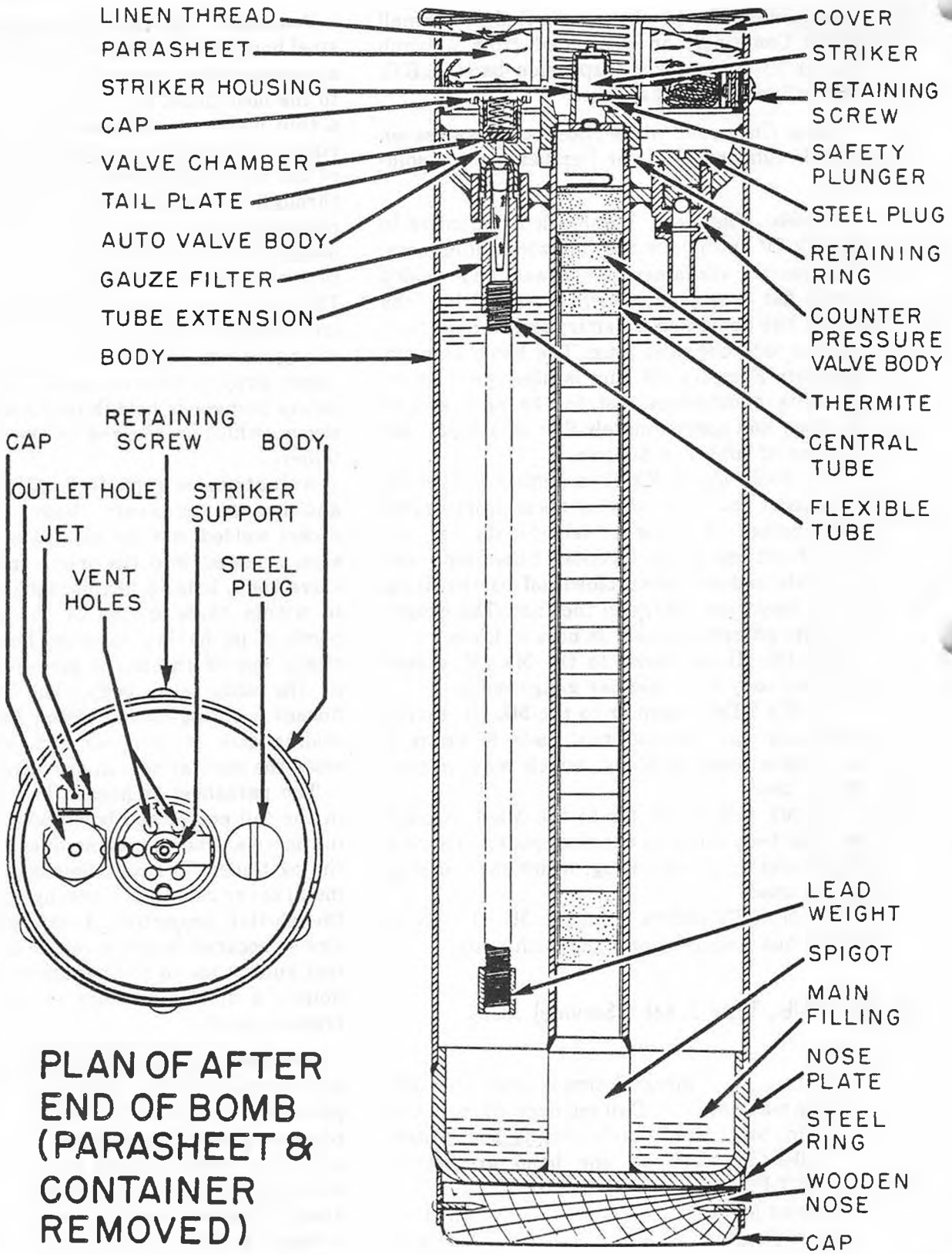


Figure 42—I.B. 30-lb., Type J, Mk I

through the paper disk covering the hole in the cellophane washer and ignites the primings in the central tube. The primings ignite the thermite, and this heats the interior of the bomb, thus raising the internal pressure. The magnesium-alloy striker housing burns away to afford additional venting to the filling in the central tube. When the pressure has risen to about 300 p.s.i. (pounds per square inch), the piston in the automatic valve is raised and the methane and petrol solution passes through the flexible tube, into the valve chamber, through the outlet hole in the jet, and through the hole in the bottom of the parasheet container. As it passes out of the jet, the liquid is ignited by the flame issuing from the vent holes in the striker housing as a result of the burning of the thermite.

Because of the lead weight, the free end of the flexible tube always falls to the lower side of the bomb as it comes to rest, so that almost all of the liquid charging passes out of the bomb through the jet. It emits a flame 15 ft. high and 2 ft. wide.

Suspension: Carried in batches of 14 in Cluster Projectiles, 500-lb., No. 4 Mk I.

Filling: The main filling consists of a solution of methane in 1.3 gallons of petrol. The bomb is filled under pressure, so that the normal filled pressure inside the bomb is from 90 to 110 p.s.i.

I.B. 45-lb. Mk I (Service)

Data

Fuzing ..... No fuze
Color markings.....Dull red over-all; stiffeners and distance pieces painted black; "HANDLE WITH CARE" stencilled between stiffeners
Over-all length .....18.3 in.
Width ..... 10 in. by 9.75 in.
Weight empty .....7 lb.
Weight filled .....45 lb.

Description: The bomb consists of a square-section, tin-plate, 5-gallon, petrol can. On one face are two corrugated stiffeners, which serve to increase the strength of the can and also act as distance pieces between the can and the drop bar of the Small Bomb Container in which the bomb is carried. A charging hole, with screwed

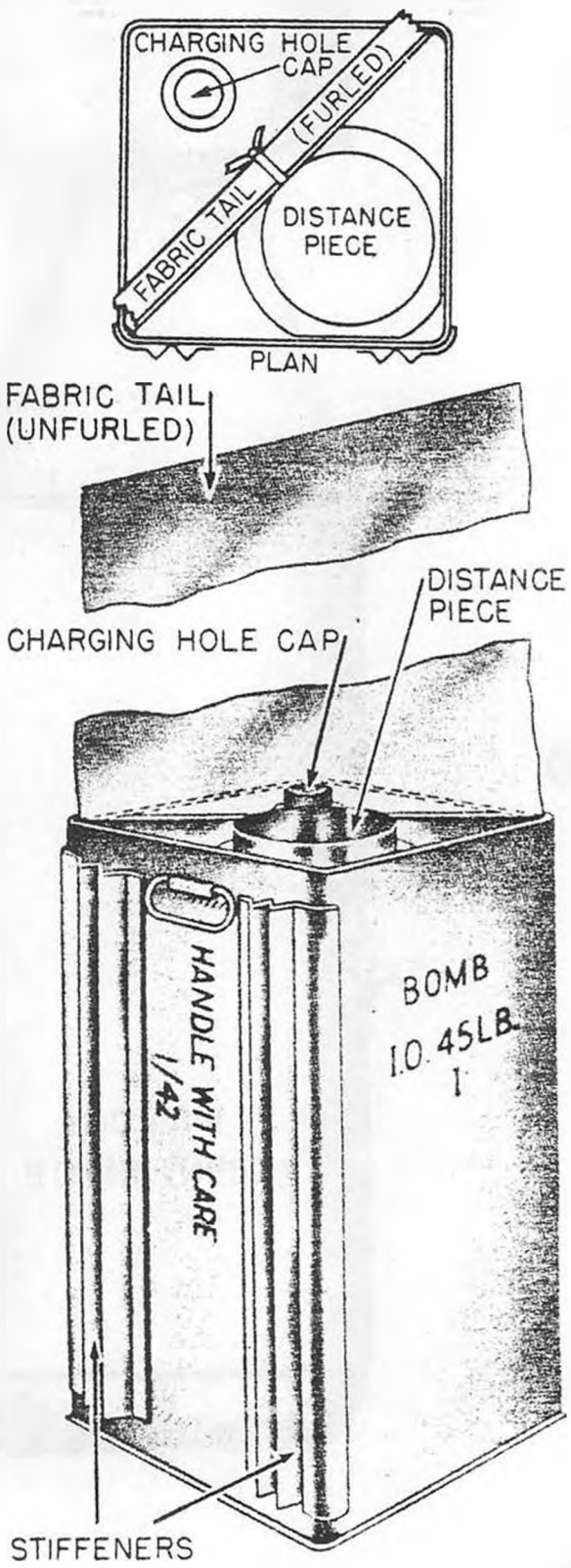


Figure 43—I.B. 45-lb. Mk I

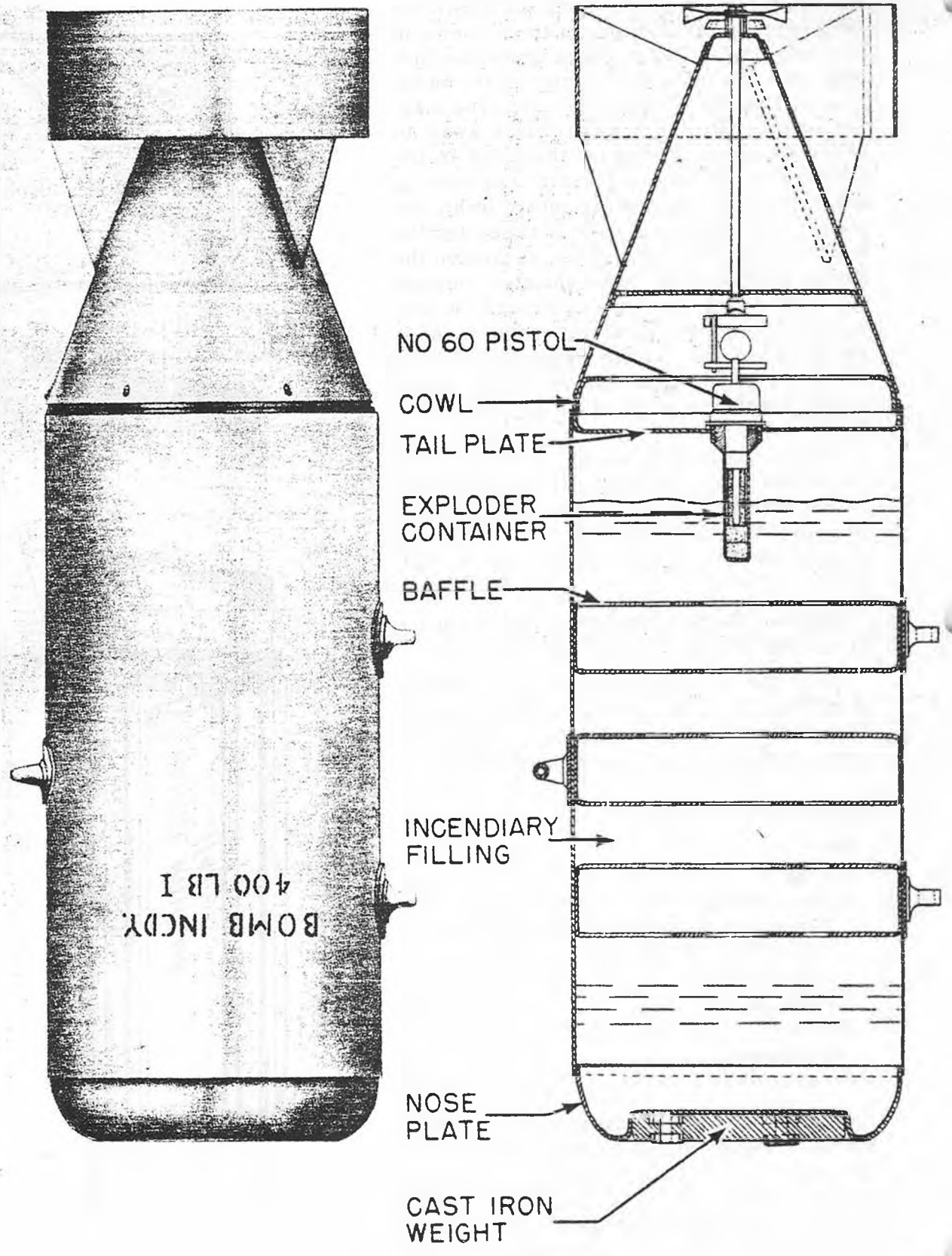


Figure 44—I.B. 400-lb. Mk I

cap and washer, and another distance piece are provided at the top of the can. At diagonally opposite corners on the top of the can are two metal loops for attachment of the 12-in. by 21-in. fabric tail, which acts as a flight stabilizer. Two handles for lifting the bomb are soldered to opposite faces of the can. Bombs of later issue may have a third handle, located on the face, to which the stiffeners are soldered.

Functioning: The bomb is fuzeless and functions by break-up. The igniter consists of droplets of a liquid which reacts with water to produce small sparks. The liquid is dispersed in a thick oil, which floats on water.

The sparks produced are not sufficient to ignite fuel oil or paraffin, but ignite petrol immediately. Thus, when the K.O.F.Q.R. and petrol charging is released on impact of the bomb with the surface of the water, the K.O.F.Q.R. ignites the petrol, which ignites the layer of oil floating on the water.

Suspension: Three of the bombs are carried in the Small Bomb Container, 250-lb.

Filling: The charging consists of 4½ gal. of aviation or M.T. petrol mixed with one quart of K.O.F.Q.R. igniter.

Remarks: This bomb is intended for the ignition of patches of fuel oil or petrol present on the surface of the sea, rivers, or other inland waterways, during attacks on oil-carrying vessels or oil-storage installations.

I.B. 400-lb. Mk I (Service)

Data

Fuzing	Tail Pistol No. 60 Mk I
Color markings	Dull red over-all; black letter stencilling
Tail No.	No. 79 Mk I
Over-all length	60.8 in.
Body length	40.7 in.
Body diameter	17.6 in.
Tail length	21.2 in.
Tail width	17.5 in.

Body Construction: The bomb body consists of a thin sheet-steel cylinder with a tail plate welded at one end and a nose at the other. The nose is recessed to accommodate a cast-iron weight, which is secured in position with bolts. Three perforated baffles are welded internally to the bomb case to reduce surging of the filling while the bomb is suspended aboard the aircraft. An internally threaded adapter in the center of the tail plate serves as a charging hole and also for the fitting of the exploder container. A cowl welded to the tail plate has six equi-spaced springs riveted inside it. These springs form an attachment for the six fasteners which secure the tail unit to the bomb. These fasteners consist of a stud and a leaf spring. The studs have an external screw-driver slot and an internal cam slot. The cam slot engages the spring attached to the cowl.

Tail Construction: The Tail No. 79 Mk I consists of a cylindrical strut attached to the tail cone by means of three tail fins. The arming fork has only one prong, which engages the T-bar of the Pistol No. 60.

Suspension: This bomb is equipped for suspension in either British or American aircraft, having on one side a single suspension lug, and dual lugs 180° removed.

Filling:

Detonators—Sensitive type
Exploders—C.E., 3-ring, and 2 solid pellets
Filling—6% aluminum laurate, 2% creosole, and 5% Napalm

Remarks: This bomb is filled with a highly volatile, inflammable gel which is readily ignited by naked flame, or by contact with water. The filling may smell of gasoline, or carbolic acid. Rubber boots, gloves, and eye-shields are recommended for all personnel engaged in disposal operations on this bomb. If the filling comes into contact with the skin, all traces should be swabbed off with a rag soaked in gasoline or paraffin, and the effected area should then be washed with water and the patient treated for alkali burns. Contaminated equipment should be cleaned with gasoline or paraffin, and then washed with water.

I.B. 500-lb. Mk I (Service)

Data

Fuzing	Tail Pistol No. 30
Color markings	Grey over-all; 3-in. red band 7 in. from nose, 3-in. dull red band 9 in. from tail

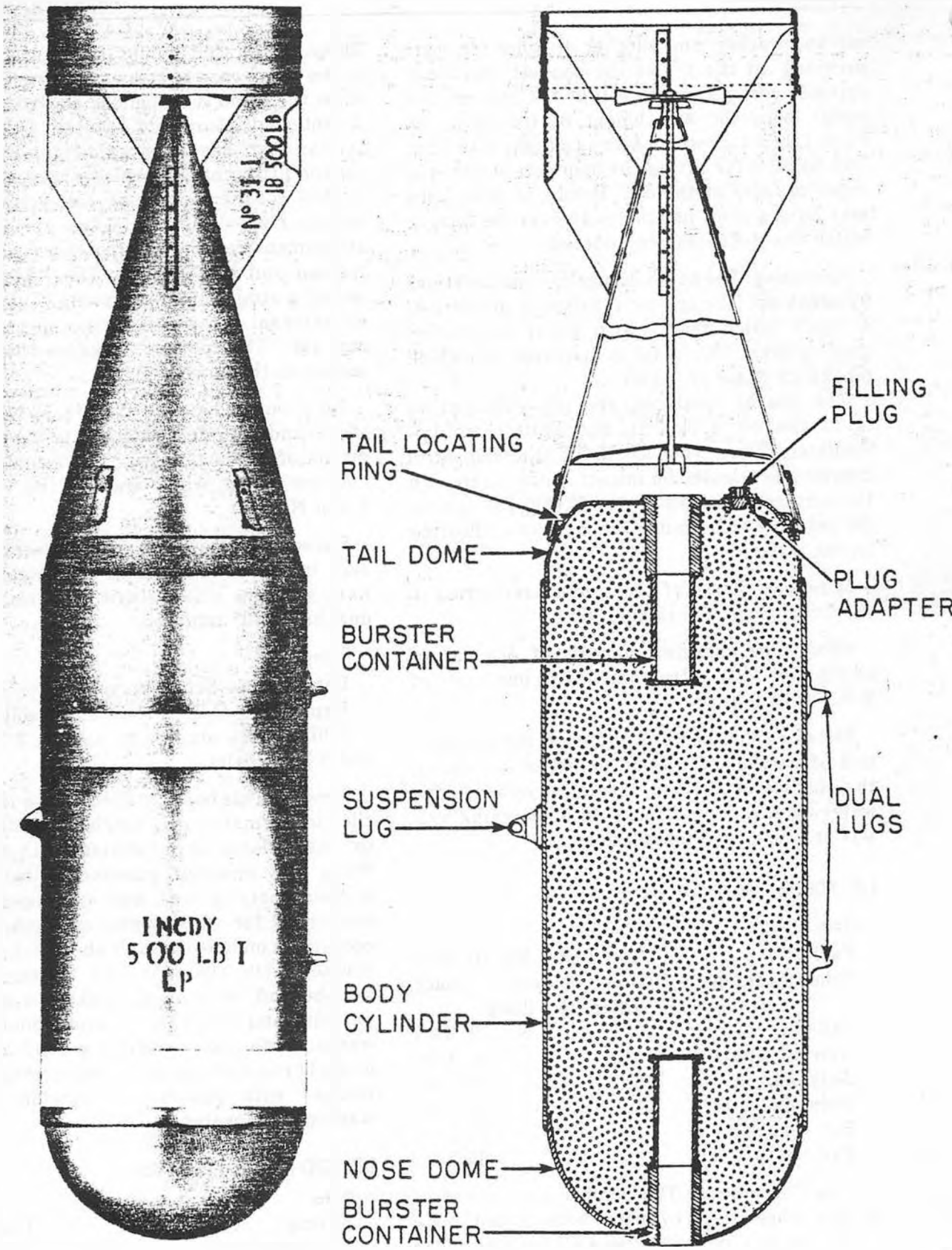


Figure 45—I.B. 500-lb. Mk I

Tail No. .....No. 31 Mk I
Over-all length .....66 in.
Body diameter .....13.1 in.
Wall thickness .....3/16 in.
Body length .....41.0 in.
Tail length .....28.0 in.
Tail width .....13.1 in.

Body Construction: This bomb consists of a cylindrical, metal container with a hemispherical nose and tail piece welded at either end. Burster containers are located at either end of the bomb, and, in the tail, to one side of the burster tube, is a filling hole closed with a threaded plug. A tail locating ring is welded around the tail portion of the bomb body.

Although provision is made in the bomb for alternate nose or tail fuzing, the nose pocket is always closed with a plug, and only the tail pocket is employed.

Tail Construction: The Tail No. 31 Mk I consists of a sheet-metal tail cone to which are riveted four vanes supported by a cylindrical metal strut. The tail is attached to the bomb by four spring clips which engage the tail locating ring on the after end of the bomb body. Inside the tail cone, supporting the lower end of the reach rod, is located a diaphragm with four large holes to allow air passage.

Suspension: A single suspension lug is provided for carrying in British planes, and two additional lugs for U. S. suspension are 180° removed.

Explosive Components
Detonator—No. 55 Mk I
Burster—No. 1 Mk I, Gunpowder
Filling—16 gallons of liquid phosphorus

Remarks: This is a special purpose bomb designed primarily for low-level bombing operations. Its use will be restricted to special missions.

It is recommended that personnel engaged in disposal operations on this bomb be equipped with rubber boots and gloves, and that these be kept damp. All equipment and protective clothing which may have come into contact with the liquid phosphorus should be washed thoroughly immediately after use.

The contents of this bomb will ignite immediately with a highly incendiary effect upon contact with the air. Following the bursting of this bomb, a dense smoke screen will be emitted for at least two hours.

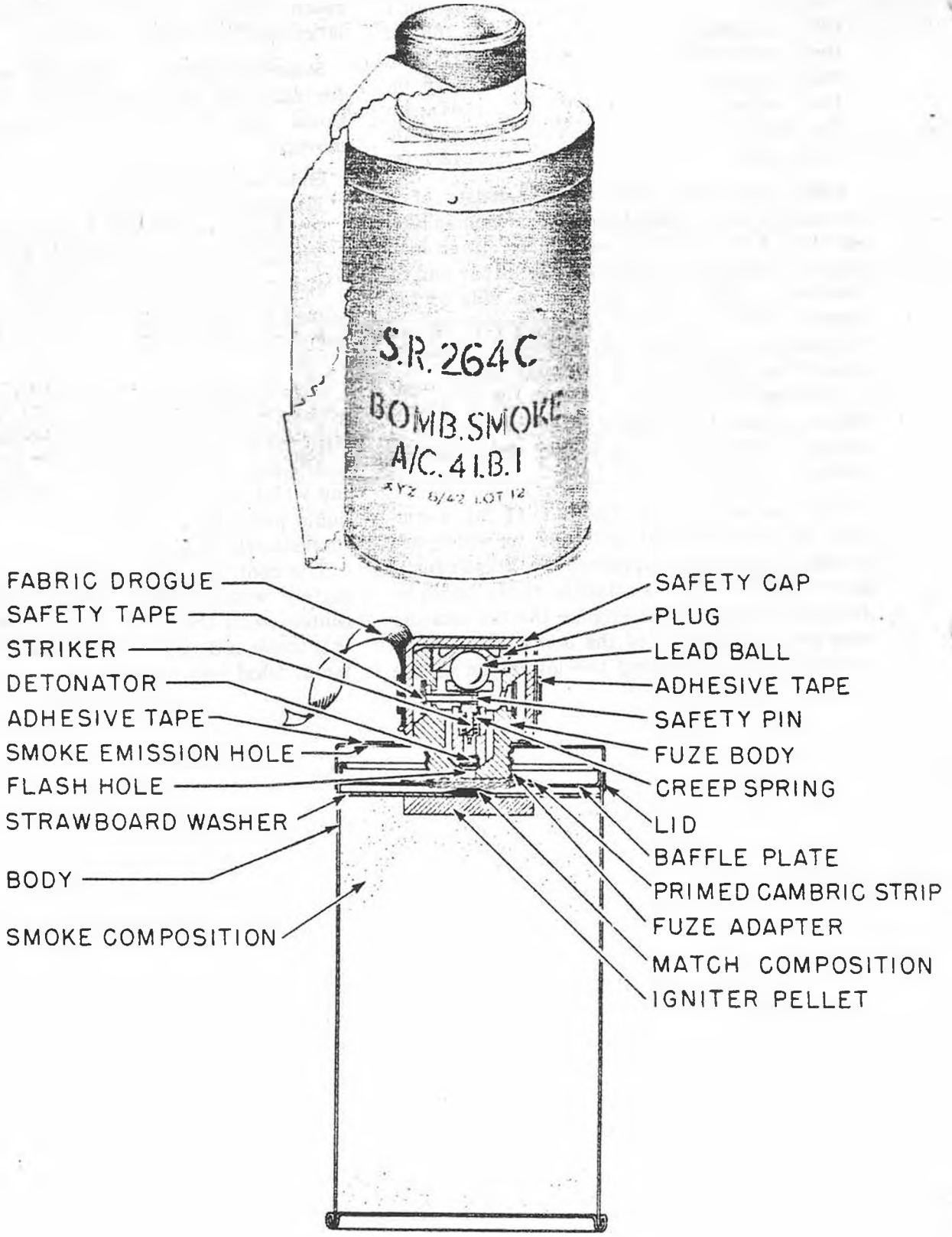


Figure 46—Smoke 4-lb. Bomb Mk I

Part I—Chapter 12

SMOKE BOMBS

Introduction

There are at present in service use only four smoke bombs, exclusive of those bombs containing smoke spotting charges. These are the 4-, 100-, 120-, and 500-lb. smoke bombs. The bombs are used to lay smoke screens to conceal troop movements.

These bombs are fuzed in the tail, except the 120-lb., which takes a nose fuze.

Smoke bombs are colored dark green over-all with a red band around the body. The 4-lb. bomb is merely a cylindrical sheet-metal can. The 100-lb. is the same size and shape as the 45-lb. incendiary, with a white phosphorus filling. The 120-lb. bomb consists of an outer container and an inner smoke canister which is blown out of the rear of the container by an ejection charge.

The 4-lb. bombs are preferably carried in Cluster Projectile No. 6, Mk I, while the 100-lb. and 120-lb. smoke bombs are generally carried in the Small Bomb Container, 250-lb. The 500-lb. bomb is suspended individually in most 500-lb. bomb stations.

Smoke 4-lb. Mks I, II, and IV (Service)

Data

Fuzing .....Tail Fuze No. 859
Color markings....Dark green over-all, with red band around nose
Tail No. .....Fabric tail
Over-all length .....7.5 in.
Body length .....7.5 in.
Body diameter .....3.6 in.
Total weight .....3 lb. 14 oz.
Burning time...Mk I, 4 min.; Mk II, 8-12 min.

Body Construction: The bomb consists of a cylindrical metal body closed at both ends and containing a smoke composition. At the tail end of the bomb is a baffle plate secured to the body and provided with a smoke emission hole covered by a strip of primed fabric held in place by two strips of adhesive tape. Beneath the baffle plate is an igniter pellet secured to a strawboard washer. The hole in the washer is filled with match composition which contacts the igniter pellet. The igniter pellet is set in the smoke composition.

Above the baffle plate is a lid secured to the bomb body and provided with a screw-threaded fuze adapter. The Fuze No. 859 Mk I is screwed and cemented into the fuze adapter.

Functioning: When the bomb is released from the Small Bomb Container, the safety cap of the fuze is drawn off by the action of air resistance on the fabric drogue. The lead sleeve on the webbing tape attached to the safety pin causes the free end of the tape to clear the waisted portion of the fuze body and be caught in the air stream, thus withdrawing the safety pin. The fuze is now armed, with the lead ball and striker held away from the detonator by the creep spring alone.

On impact with the target, the fuze functions. The flash from the detonator passes through the flash hole in the fuze body and fires the primed cambric strip, which in turn ignites the match composition. The match composition fires the igniter pellet, and this ignites the smoke composition.

The smoke generated passes through the smoke-emission hole in the baffle plate and builds up pressure beneath the lid, thus bursting the adhesive tape covering the small smoke-emission hole in the lid and permitting the smoke to escape into the air. After a short period of time the heat evolved in the bomb melts the solder securing the lid to the bomb body, and the pressure of the smoke then forces off the lid.

Suspension: These bombs are designed to be carried either in the 250-lb. Small Bomb Container, or the 500-lb. Cluster Projectile No. 6 Mk I, Smoke. In the former, the bombs are packed 14 in a metal case, and three cases are

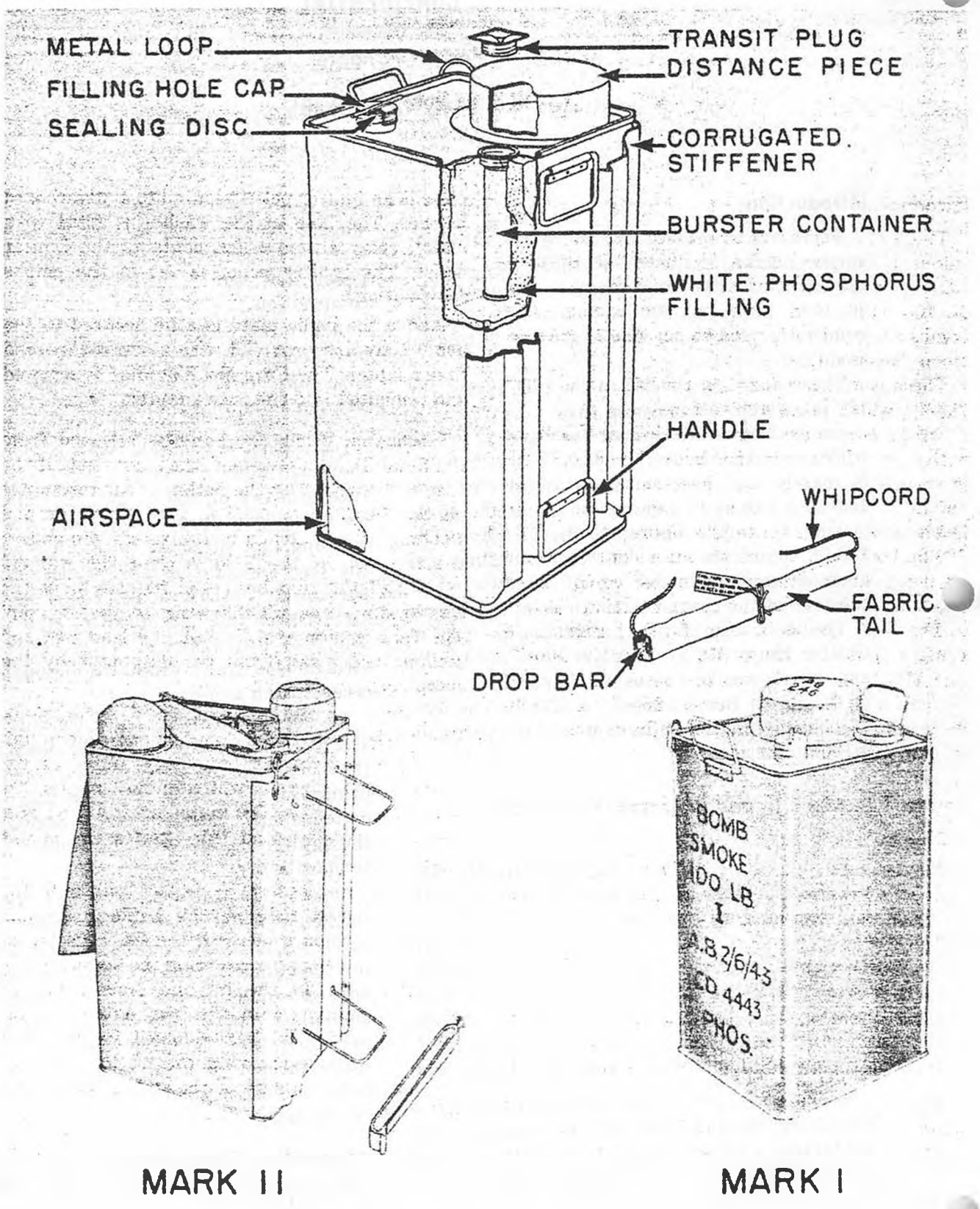


Figure 47—Smoke 100-lb. Bomb

placed in the Container. In the latter, 90 bombs are carried in five tiers of 18 bombs each. They are placed end to end longitudinally, with the fuzes pointing in opposite directions in alternate tiers.

Filling: The filling of the bomb consists of a cambric strip primed with S.R. 252, a cambric square primed with sulphurless gunpowder, ¼ lb. smoke composition S.R. 269 (M), and 3¼ lb. smoke composition S.R. 264 A (M).

Remarks: Spontaneous ignition of smoke compositions may result if the filling is wetted, especially by sea water. The bombs are dropped from aircraft to produce a smoke screen to cover land operations.

The Bomb Mk II is identical to the Mk I, except that the smoke composition is slower burning. The Bomb Mk IV is similar to the Mk II, except that the closing lid of the bomb body and the igniter pellet are slightly altered.

Smoke 100-lb. Mks I and II (Service)

Data

Fuzing.....Tail Fuze No. 854 Mk I
Color markings....Dark green over-all, with red band around lower part of body
Tail No. .....Fabric tail
Over-all length .....18.3 in.
Body length .....18.3 in.
Body diameter .....10 in. square
Tail length .....21 in.
Tail width .....12 in.
Total weight .....92-95 lb.
Charge/weight ratio .....85% (approx.)

Body Construction: The bomb consists of a thin tin-plate can of square cross-section, to one face of which are soldered two corrugated stiffeners, which serve to increase the strength of the can and also act as distance pieces between the can and the drop bar of the 250-lb. Small Bomb Container. A burster container, to take the Fuze No. 854 Mk I and its burster, and an offset filling hole are provided in the top of the can, together with a large circular distance piece.

The burster container is closed, during transit and storage, by a rolled-thread tin-plate, transit plug. The filling hole is permanently sealed by a rolled-thread filling-hole cap, seating on a sealing disc. This cap must in no circumstances be unscrewed from the bomb; and, as it is fitted with a short Tommy bar, it may be readily distinguished from the transit plug.

Three handles for lifting the bomb are provided, and at two diagonally opposite corners of the can are soldered metal loops for the attachment of a fabric tail, which acts as a stabilizer to the bomb.

Functioning: On impact of the fuzed bomb with its target, the "all-ways" action fuze functions instantaneously. The explosion of its burster disrupts the bomb and scatters the white phosphorus filling, which, on contact with the air, ignites spontaneously and begins to give off smoke.

Suspension: These bombs are carried three in a 250-lb. Small Bomb Container. In the container, they are separated from each other by the distance pieces on the end of each bomb.

Explosive Components

Burster—Gunpowder
Main filling—86 lb. white phosphorus

Remarks: The Bomb Mk II is similar to the Mk I in operation, differing only in the following minor structural details. The filling hole is centrally located in the top of the can. Two small distance pieces are provided at the top of the can and are located at diagonally opposite corners, on either side of the filling hole. The two metal loops to which the fabric tail is secured differ slightly in design from those used on the Bomb Mk I.

These bombs have a burning time of 15-20 minutes and provide an effective screen 250-300 yd. in length. They are dropped from aircraft to produce smoke screens for covering land operations.

Smoke 120-lb. Mks I and II (Service)

Data

Fuzing.....Nose Fuze No. 864 Mk I
Color markings....Dark green over-all with ½-in. red band around nose; tail is light green
Tail No. .....No. 41 Mk II
Burning time .....20 minutes
Over-all length .....31 in.
Body length .....15.8 in.

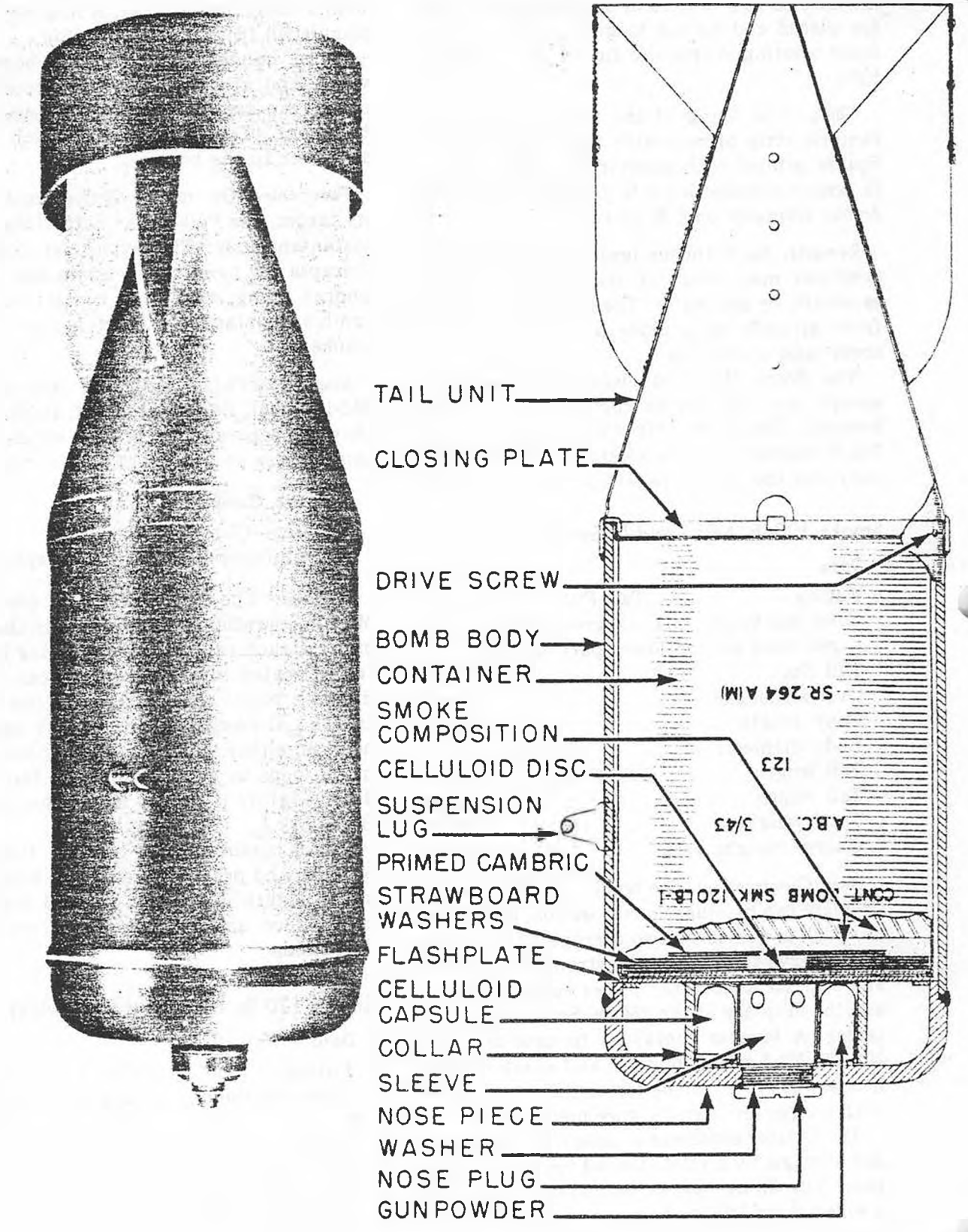


Figure 48—Smoke 120-lb. Bomb Mk I

Body diameter .....9.5 in.
Wall thickness .....0.25 in.
Tail length .....15.1 in.
Tail width .....10 in.
Total weight .....120 lb.

Body Construction: The bomb consists of a cylindrical body to which the tail unit is secured. The body houses a metal container filled with a smoke composition, and a gunpowder ejection charge contained in nine celluloid capsules. The bomb body is a steel tube welded to a flattened nose-piece. The nose-piece is centrally tapped to receive the fuze, and, during transit and storage, is sealed by a nose transit plug and leather washer. A suspension lug is welded to the exterior of the bomb body.

A steel flash plate, abutting the nose-piece within the bomb body, has a steel collar secured to it. A small centrally-located hole is drilled through the flash plate, and is sealed by a paper disc. The nine celluloid capsules, each filled with 1 oz. 1 drm. of gunpowder, are retained in the collar by a cardboard sleeve, and felt and cardboard washers. The sleeve has six equi-spaced holes near its inner end.

The metal container, filled with approximately 50 lb. of smoke composition (H.C.E.), is housed in the bomb body against the flash plate. It has a 3-in. diameter hole sealed with a celluloid disc. Between this disc and the smoke composition there are four strawboard washers, each with a 1½-in. diameter hole; the hole so formed being sealed by two squares of primed fabric. The container is retained in position against the flash plate by a closing plate fitted into the rear end of the bomb body, and secured by four turned-over metal tabs.

Tail Construction: The tail unit is secured to the bomb body by eight drive screws, and consists of a tail cone to which a cylindrical vane is secured by four vane supports.

Functioning: On impact of the bomb with the target, the magazine of the fuze explodes after a delay of not less than ½ sec., during which period the bomb will have come to rest. The flash from the fuze magazine, passing through the hole in the flash plate and the celluloid disc, ignites the two primed cambric squares, which in turn ignite the smoke composition in the container.

Concurrently with the ignition of the smoke composition, the flash from the fuze magazine also passes through the holes in the cardboard sleeve to initiate the gunpowder ejection charge contained in the nine celluloid capsules. The resulting explosion of the gunpowder ejects the tail, the closing plate, the container of burning smoke composition, and the flash plate, clear of the crater formed by the bomb.

Suspension: Two bombs may be carried in a 250-lb. Small Bomb Container, or the bombs may be suspended individually by a single lug. The Bombs Mk II may be fitted with twin lugs for suspension in American aircraft.

Explosive Components

Magazine—Gunpowder
Ejector Charge—Gunpowder in nine celluloid capsules
Main Filling—Smoke Composition (H.C.E.)

Remarks: The smoke composition contained in these bombs is liable to spontaneous ignition if it should become wet, particularly with sea water. The Bomb Mk II is similar to the Mk I in operation, the principal differences being a modified tail assembly and arrangement for twin suspension lugs for carrying in American aircraft.

Smoke 500-lb. Mk I (Service)

Data

Fuzing.....Tail Pistol No. 30 Mk IV
Color markings....Dark green over-all, with a red band around the lower part of the body
Over-all length .....66.0 in.
Body diameter .....13.1 in.
Body length .....41.0 in.
Tail No. .....No. 31 Mk I
Tail length .....28.0 in.
Tail width .....13.1 in.
Wall thickness .....3/16 in.
Total weight .....400 lb. (approx.)
Charge/weight ratio 60%

Body Construction: This bomb consists of a cylindrical metal container with a hemispherical nose and tail piece welded at either end. Burster containers are located at each end of the bomb and, in the tail, to one side of the burster tube, is a filling hole closed with a

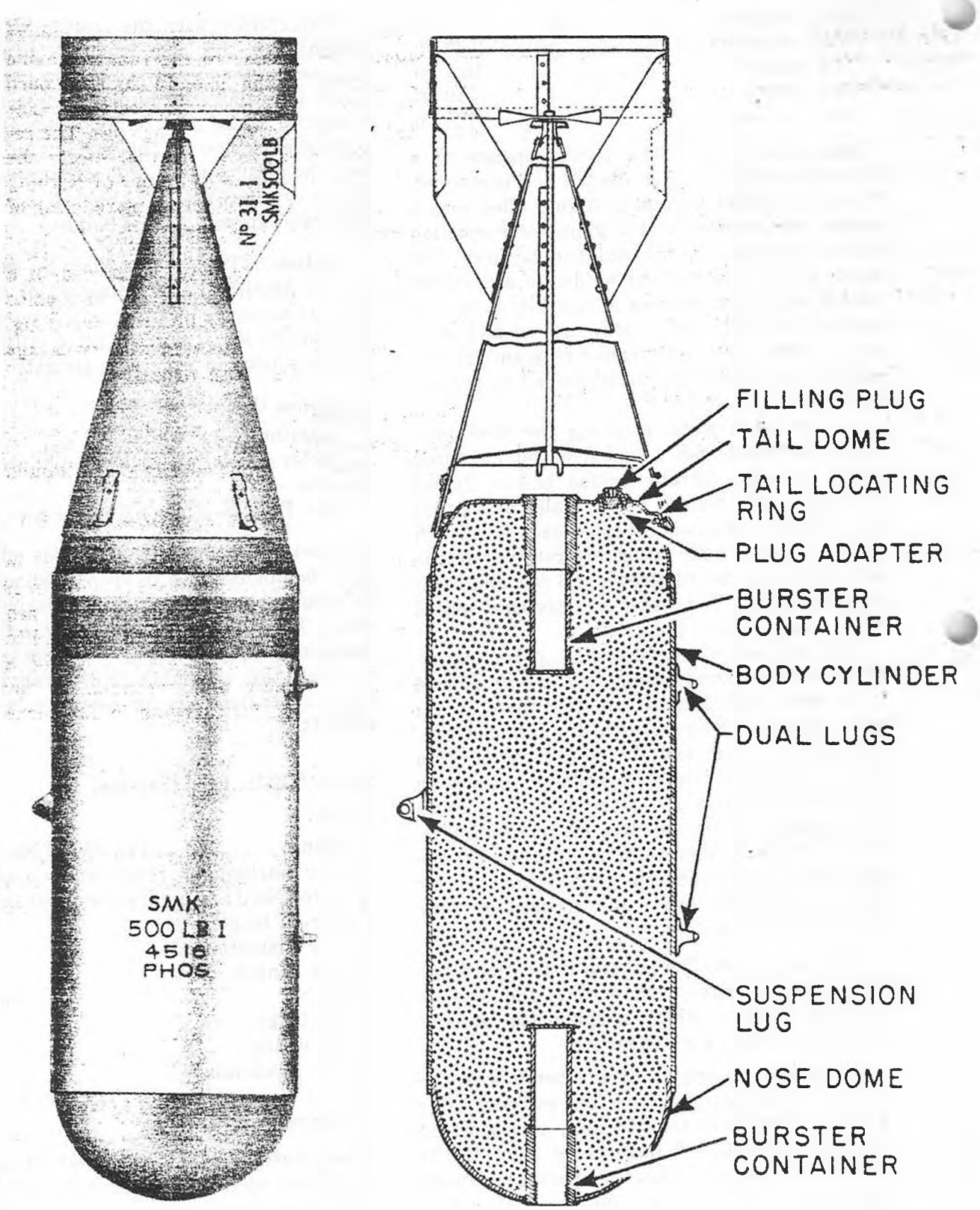


Figure 49—Smoke 500-lb. Bomb Mk I

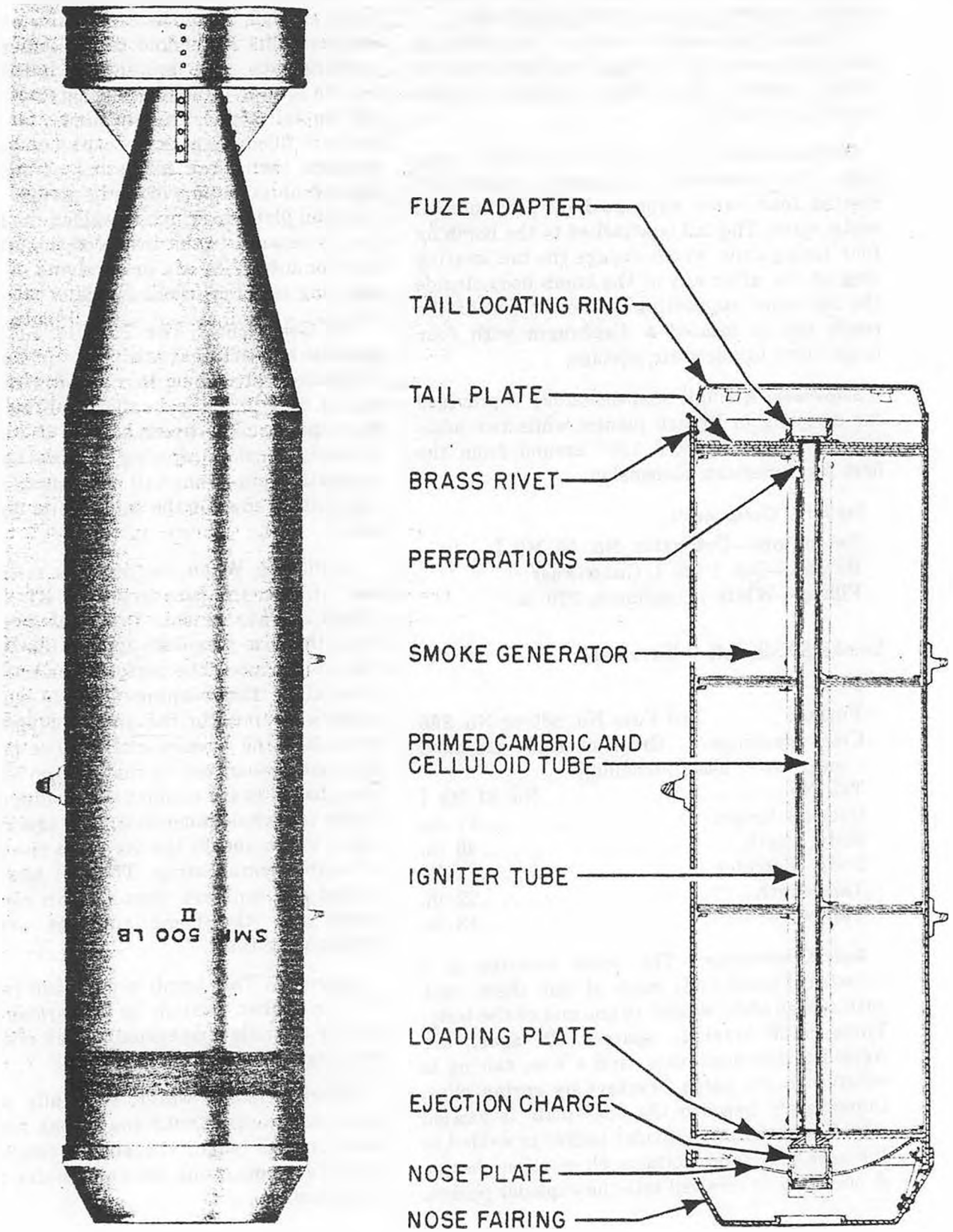


Figure 50—Smoke 500-lb. Bomb Mk II

threaded plug. A tail locating ring is welded around the after portion of the bomb body.

Although provision is made in the bomb for alternate nose or tail fuzing, the nose pocket is always closed with a plug, and only the tail pocket is employed.

Tail Construction: The Tail No. 31 Mk I consists of a sheet-metal tail cone to which are riveted four vanes supported by a cylindrical metal strut. The tail is attached to the bomb by four spring clips, which engage the tail locating ring on the after end of the bomb body. Inside the tail cone, supporting the lower end of the reach rod, is located a diaphragm with four large holes to allow air passage.

Suspension: A single suspension lug is provided for carrying in British planes, while two additional lugs are located 180° around from the first for American suspension.

Explosive Components

Detonators—Detonator No. 55 Mk I
Burster—No. 1 Mk I, Gunpowder
Filling—White phosphorus, 270 lb.

Smoke 500-lb. Mk II (Service)

Data

Fuzing.....Tail Fuze No. 885 or No. 886
Color markings....Green over-all; red band near nose; black stencilling
Tail No. .....No. 81 Mk I
Over-all length .....67 in.
Body length .....46 in.
Body diameter .....13 in.
Tail length .....22 in.
Tail width .....13 in.

Body Construction: The bomb consists of a cylindrical bomb body made of thin sheet steel, with a nose plate welded to one end of the body. Three catch brackets, spaced 120° apart, are welded to the nose plate, and a nose fairing is secured to the catch brackets by spring clips. Immediately beneath the nose plate is located a loading plate. An exploder pocket is welded to the nose plate and contains an ejection charge. A nose plug is screwed into the exploder pocket.

An igniter tube with four series of perforations extends down the center axis of the bomb and contains a celluloid tube holding a primed cambric tube. The igniter tube is held in place by the igniter-tube holder, located in the center of the tail plate. The remainder of the bomb body is filled with three banks of smoke generators, each bank consisting of eight wedge-shaped units fitted with drag plates.

A tail plate, to which is welded the fuze adapter, is secured to the inside of the after end of the bomb body by six brass rivets. A tail locating ring is fitted to the inside of the tail plate.

Tail Construction: The Tail No. 81 Mk I consists of a cylindrical strut held in place on the truncated tail cone by four sheet metal fins. The tail is held in place on the bomb by the usual four spring clips, which engage in four similar recesses in the tail ring on the bomb body. A locating pin in the tail ring engages a slot in the bottom edge of the tail cone to position the tail.

Functioning: When the bomb is released fr the aircraft, the fuze is armed. At a predetermined height, the fuze functions and the flash from the fuze magazine ignites the contents of the igniter tube. The perforations in the igniter tube allow the burning celluloid and primed cambric to initiate the smoke generators and eventually the ejection charge. The pressure of the gases generated by the ignition of the ejection charge bears against the loading plate and forces the whole inner assembly against the tail plate, which shears the six brass rivets holding it to the bomb casing. The tail plate and attached tail unit are then thrown clear of the bomb, and the bomb contents are ejected through the tail.

Suspension: This bomb is equipped for suspension in either British or American aircraft, having a single suspension lug on one side and dual lugs 180° removed.

Remarks: Should water, especially sea water, come into contact with the smoke composition used in this bomb, the smoke composition is liable to spontaneous combustion due to chemical action.

LIGHT-CASE (CHEMICAL) BOMBS

Introduction

There are at present in service use only four sizes of L.C. (chemical) bombs. These are the 30-, 65-, 250-, and 500-lb. L.C. bombs. These bombs are designed to contaminate an area by dispersal of their gas filling.

The 30- and 65-lb. bombs are constructed of very light gauge metal, and are designed to operate either by break-up on impact, or by functioning of their fuzes. The 250- and 500-lb. bombs are made of slightly heavier gauge metal, and are nose fuzed to function on impact with a target, or possibly for aerial burst, in the case of the 500-lb. bomb.

All L.C. bombs are painted grey over-all and have additional color bands to indicate the type of gas with which they are filled.

L.C. 30-lb. Mks I and IM (Service)

Data

Fuzing.....Nose Fuze No. 38 Mk I or II
Color markings.....Grey over-all; colored bands to indicate filling
Over-all length .....32.75 in. (fuzed)
Body diameter .....5 in.
Total weight.....30 lb. (approx.)

Body Construction: The bomb consists of a steel, tubular body to which is welded a steel tail plate, a steel nose plate, and a nose fairing. The fuze container is screwed and welded into the nose plate.

A spigot, having a central charging hole, is welded into the tail plate and closed by the charging-hole plug. The spigot has external threads onto which the tail is threaded.

The inside of the bomb usually has a protective coating of bakelite varnish to retard corrosion. The external areas around the charging hole plug and fuze container are painted with khaki detector paint, which turns red when exposed to gas.

Tail Construction: The tail consists of a tinplate cone, the apex of which is surrounded by a cylindrical tail vane connected to the cone by vane supports. A diaphragm, having a threaded hole by which the tail is threaded onto the spigot, closes the base of the tail; and a tail adapter closes the apex of the tail. An adjusting bolt, having a rounded head, is screwed into the tail adapter and locked in position by a lock nut.

Functioning: On impact with a soft target the fuze functions, and, after a short delay during which time the bomb has come to rest, ignites the gunpowder ejection charge, thus blowing off the tail and tail plate and ejecting the chemical filling. On impact with a hard target, the bomb will normally break up and distribute the charging before the ejection charge functions.

Suspension: The Mk I and Mk IM can be carried in the 250-lb. Small Bomb Container. The Mk IM can be used on a Light Series bomb carrier when fitted with a suspension band.

Remarks: The Bomb Mk I may be fitted with retarding equipment consisting of a flat nose cap, which replaces the nose fairing, and a flat steel retarder plate, which is held in place on the tail by the adjusting bolt and lock nut.

The Mk IM bomb is the same as the Mk I except for two locating pieces, welded to the body, which serve to locate a suspension band.

L.C. 30-lb. Mk II (Service)

Data

Fuzing ..... None
Color markings....Grey over-all; color bands to indicate filling
Over-all length .....32.8 in.
Body diameter .....5 in.
Total weight .....30 lb. (approx.)

Body Construction: The bomb has a cylindrical, plated body of light-gauge metal. A steel nose

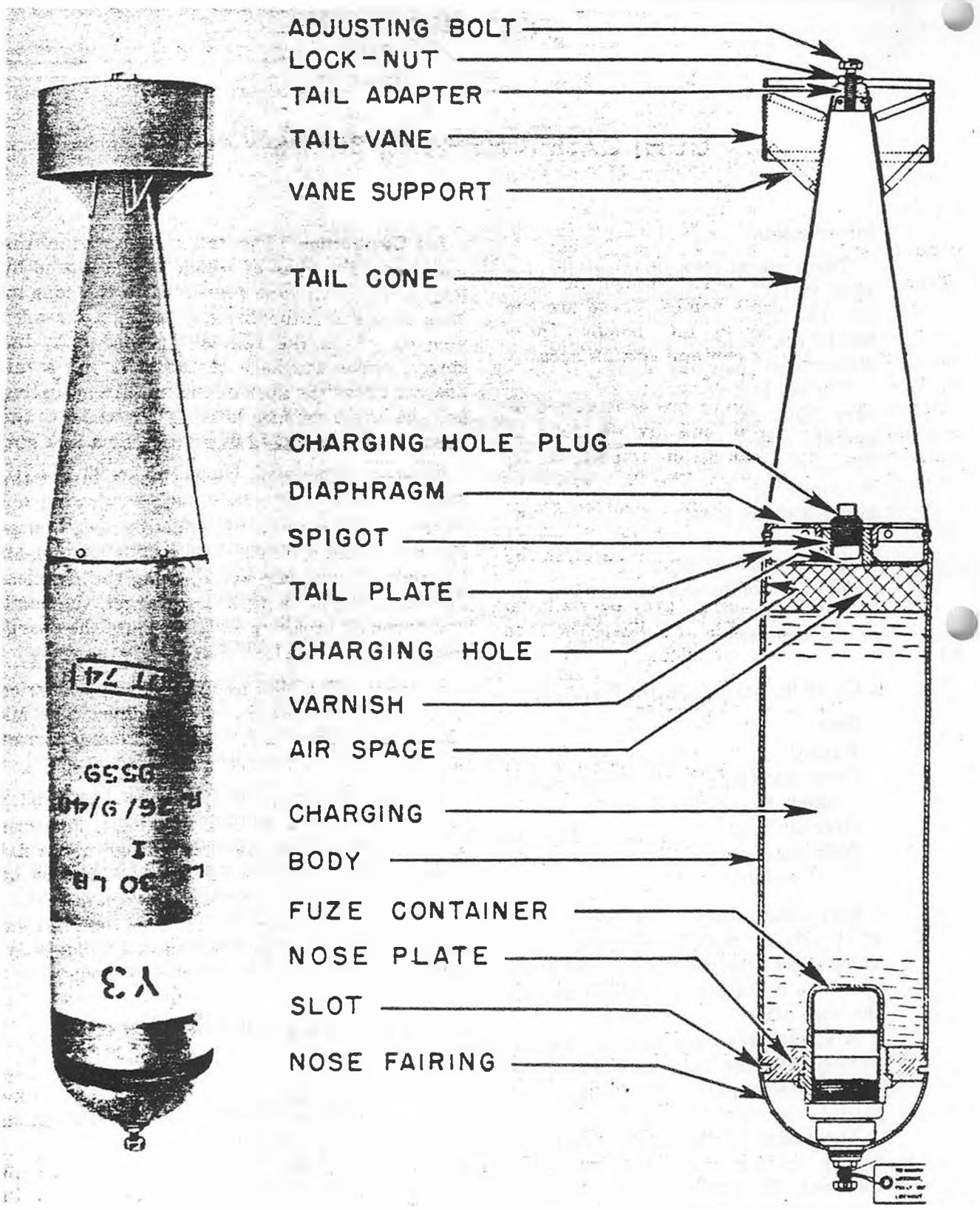


Figure 51—L.C. 30-lb. Bomb Mk I

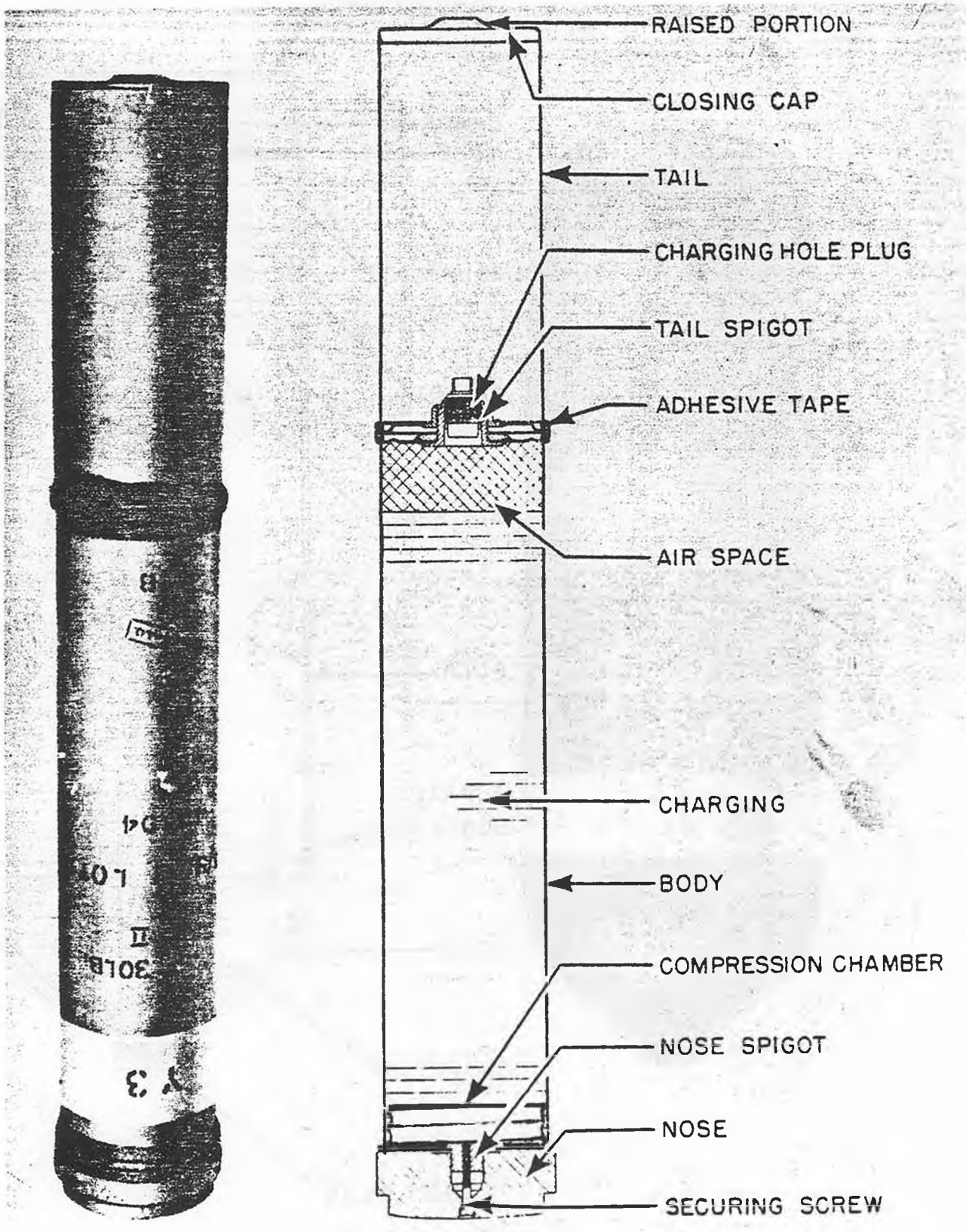


Figure 52—L.C. 30-lb. Bomb Mk II

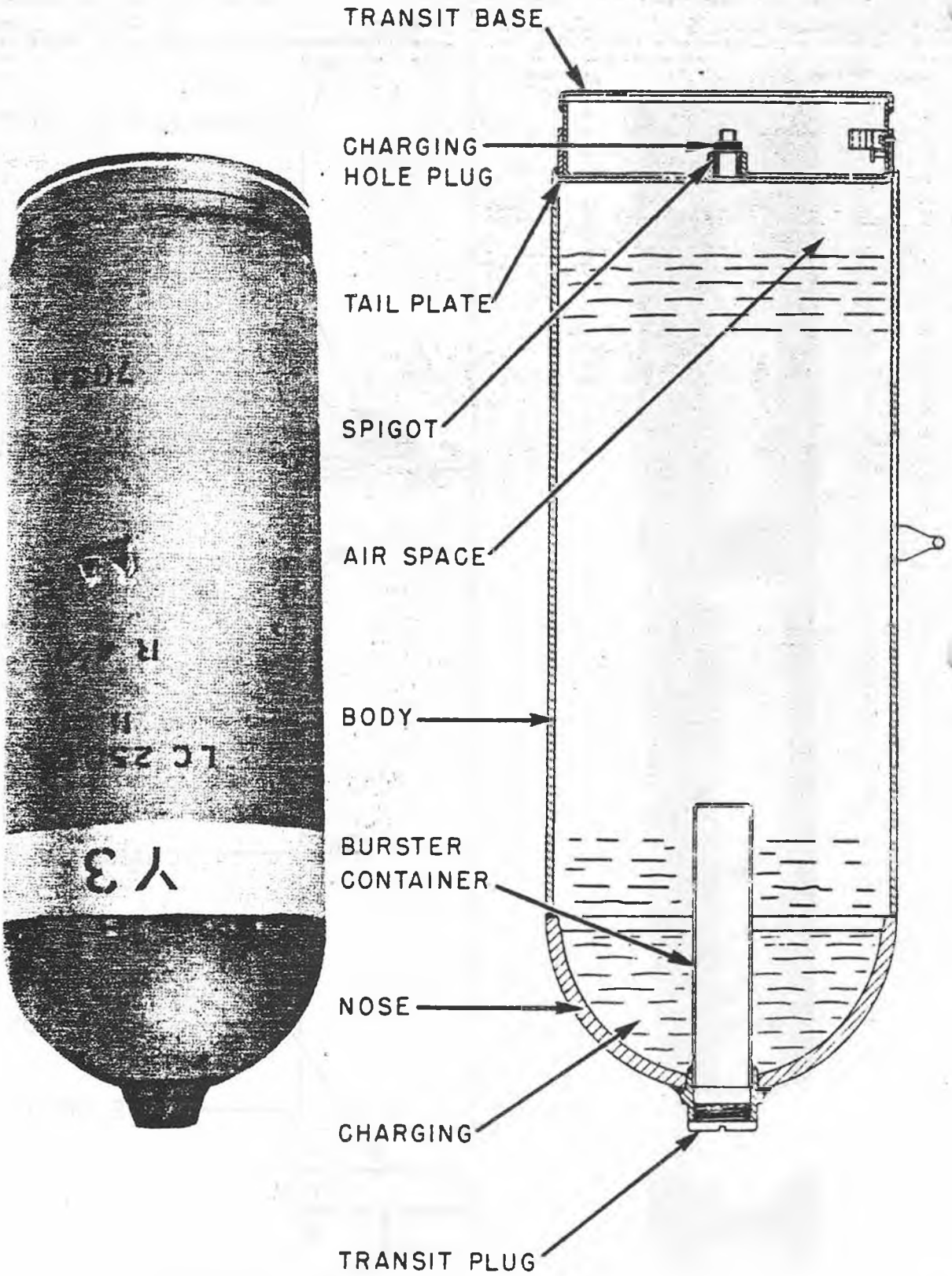


Figure 53—L.C. 250-lb. Bomb Mk II

is threaded onto a nose spigot and held in position by a securing screw. A compression chamber in the nose of the bomb collapses if the bomb is roughly handled, and so reduces the possibility of rupturing the seams of the bomb.

The tail is screwed onto a tail spigot which contains the charging hole and is closed by the charging hole plug. Adhesive tape provides an external seal between the tail and the bomb body. The after end of the tail is closed by a closing cap.

The inside of the bomb usually has a protective coating of bakelite varnish, and the areas around the charging-hole plug and body seams, also the adhesive tape, are painted with khaki detector paint, which turns red when exposed to gas.

Functioning: The bomb breaks upon impact with a target and scatters the filling. It should not be dropped on soft targets from over 1,000 ft.

Suspension: The bomb is carried in a 250-lb. Small Bomb Container.

L.C. 65-lb. Mks I and II (Service)

Data

Fuzing ..... None
Color markings.....Grey over-all; colored bands to indicate filling
Over-all length .....18.3 in.
Body diameter .....5 in. (square)
Total weight.....63 lb. (approx.)

Body Construction: The bodies of the Bombs Mk I and Mk II are same as those of the Smoke 100-lb. Mks I and II, respectively, except that the L.C. bombs do not have any provision for fuzing. The tails of both L.C. and Smoke bombs are exactly the same.

Functioning: On release from the Small Bomb Container, the fabric tail of each bomb unfurls and acts to stabilize the bomb in flight. On impact with the target, the bomb breaks up and the filling is scattered.

Suspension: Three bombs are carried in the 250-lb. Small Bomb Container.

L.C. 250-lb. Mks I, IB.V., II, and II* (Service)

Data

Fuzing.....Nose Fuze No. 36 Mks I and II when loaded in Universal-type bomb carrier; Nose Pistol No. 44 when tier-type bomb stowage is used.
Color markings.....Gray over-all; colored bands to indicate filling
Tail No. .....No. 1 Mk I
Body length .....34.25 in.
Body diameter .....12 in.
Tail length .....27.2 in.
Tail width .....12 in.
Total weight .....250 lb. (approx.)

Body Construction: The Bomb Mk II consists of a tubular steel body to which a hemispherical nose is welded. A burster container is screwed and cemented into the nose. A tail plate is welded to the other end of the body and has a spigot through which passes a charging hole. The charging hole is closed by a square-headed charging hole plug. The skirt of the tail plate is provided with two bayonet slots and a circular hole to retain the tail or transit base. The interior of the bomb is varnished, and the areas around the charging-hole plug and the burster container are coated with khaki-colored detector paint, which turns red when exposed to gas.

Tail Construction: The Tail No. 1 Mk I consists of a tail cone at the apex of which a circular strut is attached by fins. A skirt at the base of the tail cone has two fixed pins and a third pin, secured to a leaf spring, which engage the bayonet slots and the hole in the skirt of the tail.

Suspension: The bomb is fitted with a single suspension lug for carrying on a Universal-type bomb carrier. It is also carried in U. S. aircraft using tier-type bomb stowage. The bomb may also be equipped with a trunnion band for carrying on dive bombers.

Explosive Components

Detonators—No. 52 Mk II (with Pistol No. 44)
Burster—Black powder
Filling—Chemical warfare agent

Remarks: The Bomb Mk II* is the same as the Mk II, only the burster container is welded in addition to being screwed and cemented in place. The Bomb Mk I differs from the Mk II in that the interior is unvarnished and the burster container is secured by welding only. The Mk IB.V. differs from the Mk II in that the burster

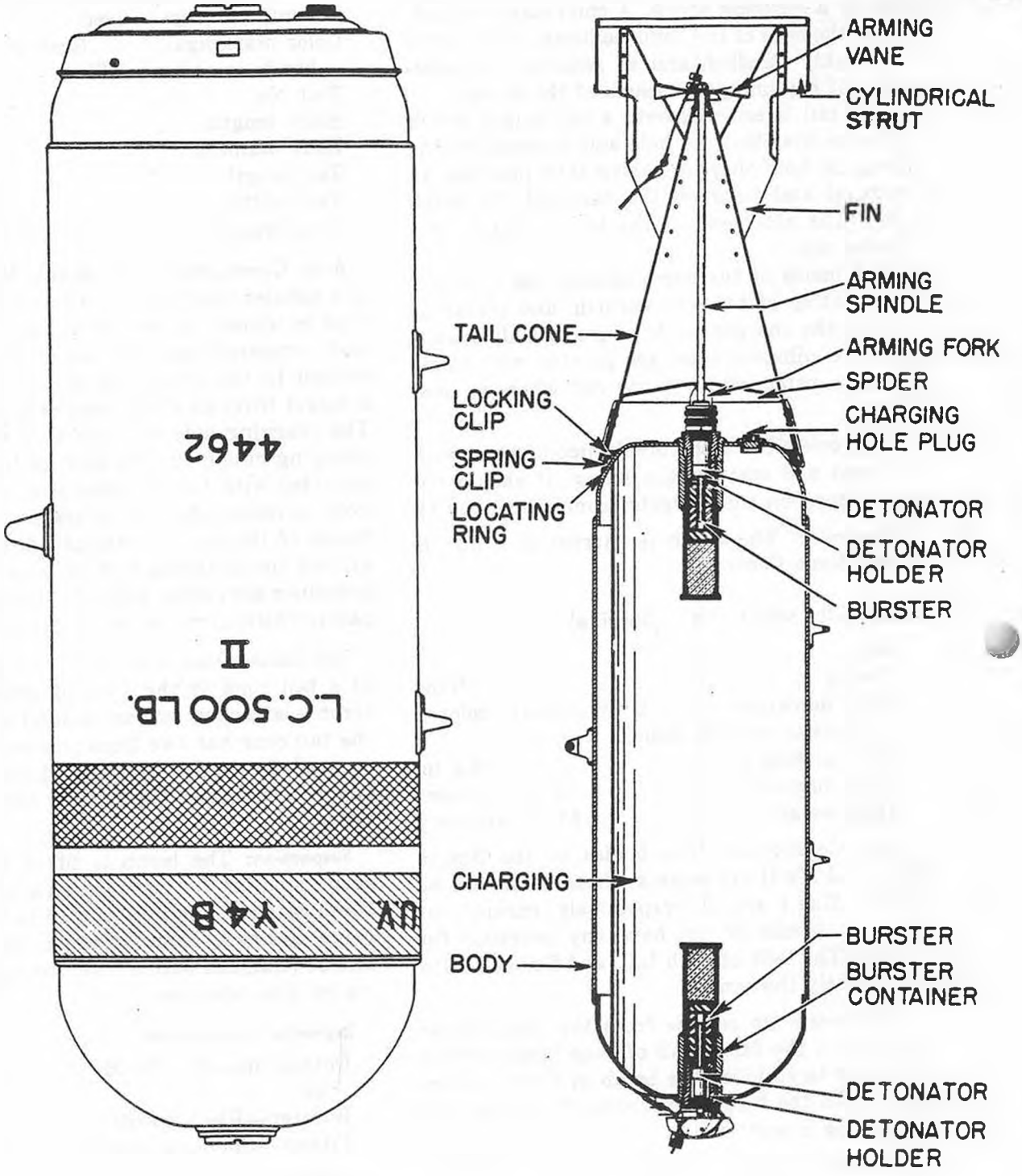


Figure 54—L.C. 500-lb. Bomb Mk II

container is welded on, and the tail plate has a slightly smaller internal diameter. The letters B.V. stand for the "bakelite varnish" which is applied internally to the walls of this bomb.

L.C. 500-lb. Mk II (Service)

Data

Fuzing.....Aerial burst: U. S. Nose Fuze M111, M111 A1, or M111 A2; ground burst: Nose Pistol No. 44 Mk I, II, or III, and Tail Pistol No. 30 Mk IV
Color markings.....Grey over-all; colored bands to indicate filling
Tail No. .....No. 31 Mk I
Over-all length .....66 in.
Body length .....41 in.
Body diameter .....13.1 in.
Tail length .....28 in.
Tail width .....12.8 in.
Total weight .....330 lb. (approx.)

Body Construction: The body consists of a light, tubular container of welded sheet steel to which a nose dome and tail dome, each fitted with a burster container, are welded. The tail dome also contains the charging hole, which is closed by a steel charging hole plug. A tail locating ring is welded to the tail dome.

The body has four rectangular slots and a locating pin for the attachment of the tail. The interior of the bomb is unvarnished.

Tail Construction: The Tail No. 31 Mk I consists of a tail cone to which a cylindrical strut is attached by four tail fins. The base of the cone is fitted with four spring clips, each of which is provided with a turnbuckle locking clip. A slot on the base of the cone fits over the locating pin on the bomb to insure correct positioning on assembly.

The conventional type of arming assembly is fitted into the tail.

Suspension: A single suspension lug is present for use on British planes, while two lugs, 180° removed, provide for suspension on U. S. planes.

Explosive Components

Detonators—Aerial burst fuzing, No. D.38 Mk I; ground burst fuzing, two Detonators No. 52 Mk II or III

Bursters—No. 1 Mk I

Filling—14½ gallons of the designated chemical warfare agent

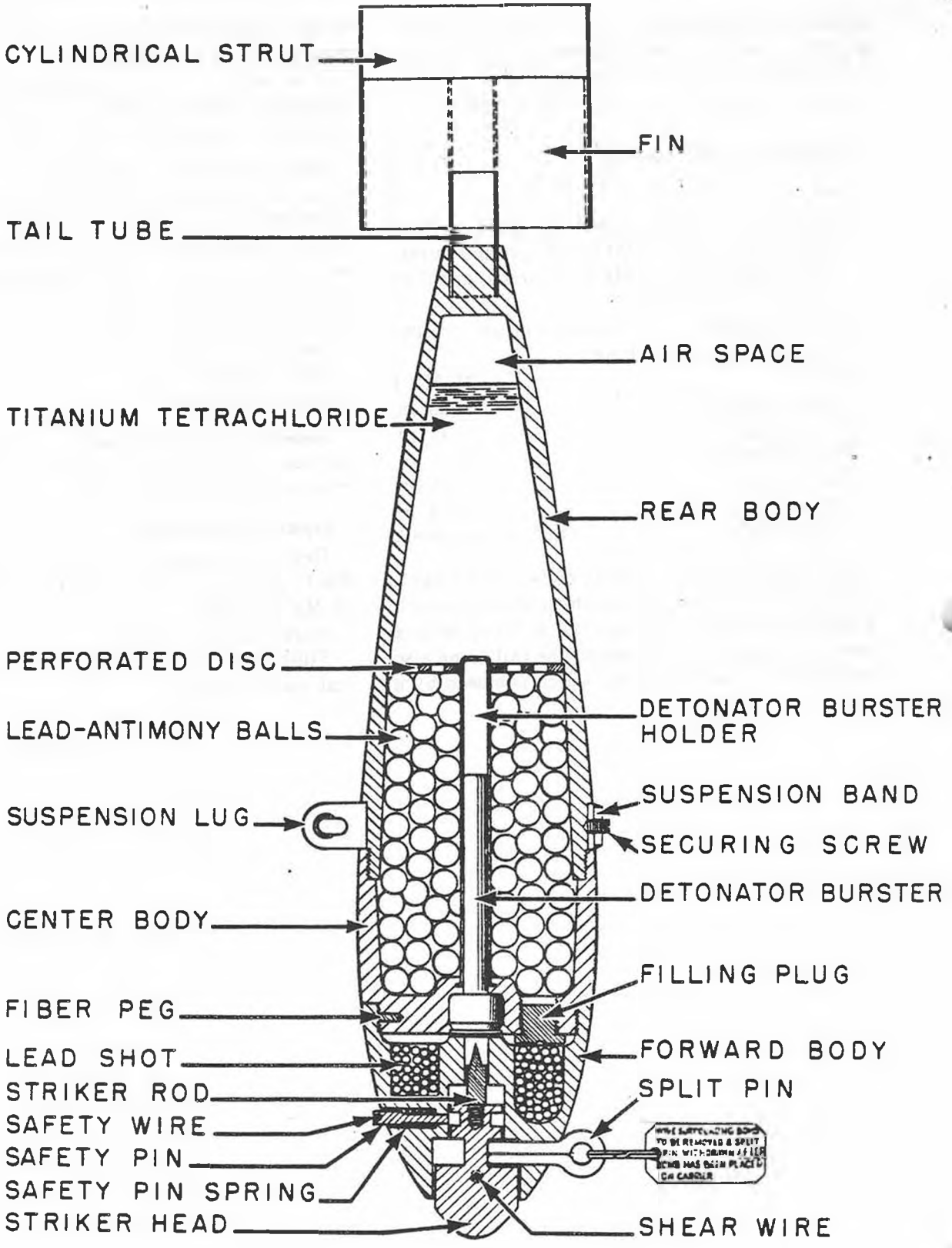


Figure 55—Practice 8.5-lb. Bomb Mk I

PRACTICE BOMBS

Introduction

Included in this section are five sizes of practice bombs. These are the only ones specifically designed for that purpose, although there are currently in use several practice bombs which are merely service bombs inert-loaded with sand, water, or a chalk/lime solution. The standard practice bombs generally emit smoke as a spotting charge to indicate bombing accuracy.

Standard practice bombs are painted white over-all with two light green bands painted around the center of the tail. Inert-loaded service bombs used as practice are painted black. Practice bombs containing an exploder have a red band painted around the rear portion of the body.

Practice 8-lb. Mk I (Service)

Data

Fuzing ..... None
Color markings.....White over-all with two ½-in. green bands around after body
Over-all length .....16 in.
Max. body diameter .....4 in.
Total weight .....8 lb. (approx.)

Body Construction: The body consists of an asbestos cement cylinder, in the nose of which is cemented a glass flask containing about ½ pint of titanium tetrachloride. The rear of the cylinder is hollow and acts as a tail unit. A light metal suspension band is secured to the exterior of the bomb body.

Functioning: On impact the bomb body and glass flask break up, releasing the titanium tetrachloride to form a smoke cloud. The bomb contains no explosive.

Remarks: The bomb is designed for low-level training purposes against airfield targets, and is of such construction that it leaves no debris injurious to aircraft tires.

Practice 8.5-lb. Mks I, II, and III (Service)

Data

Fuzing.....Simple, integral striker arrangement with detonator burster No. 28 Mk I
Color markings.....White over-all, with two ½-in. green bands ½ in. apart around after body.
Over-all length .....16 in.
Body length .....12 in.
Body diameter .....3.0 in.
Wall thickness .....0.5 in.
Tail length .....4 in.
Tail width .....3 in.
Total weight .....8.5 lb.

Body Construction: The Bombs Mk I and Mk III have a molded plastic body, which is made in three parts: a nose section housing the striker, a center section housing the detonator burster and filling plug, and a rear section which is hollow and closed at the after end. A perforated disc inside the rear section supports the end of the detonator burster holder. The center part of the body is filled with lead-antimony balls, with the interstices between them, and all but a 10% air space in the rear section cone, filled with titanium tetrachloride, or gunpowder and magnesium turnings.

The striker head is retained in handling by a cotter pin, safety pin, and shear wire. An annular groove inside the nose portion is filled with lead shot secured by wax.

The Bomb Mk II nose is fitted for an extension rod.

Tail Construction: The tail assembly consists of a tube molded into the rear section of the body, with a cylindrical strut attached to the tube by four fins.

Suspension: The bomb is suspended by a single suspension lug on a band, which fits in a groove in the body, and is secured in place by a securing screw.

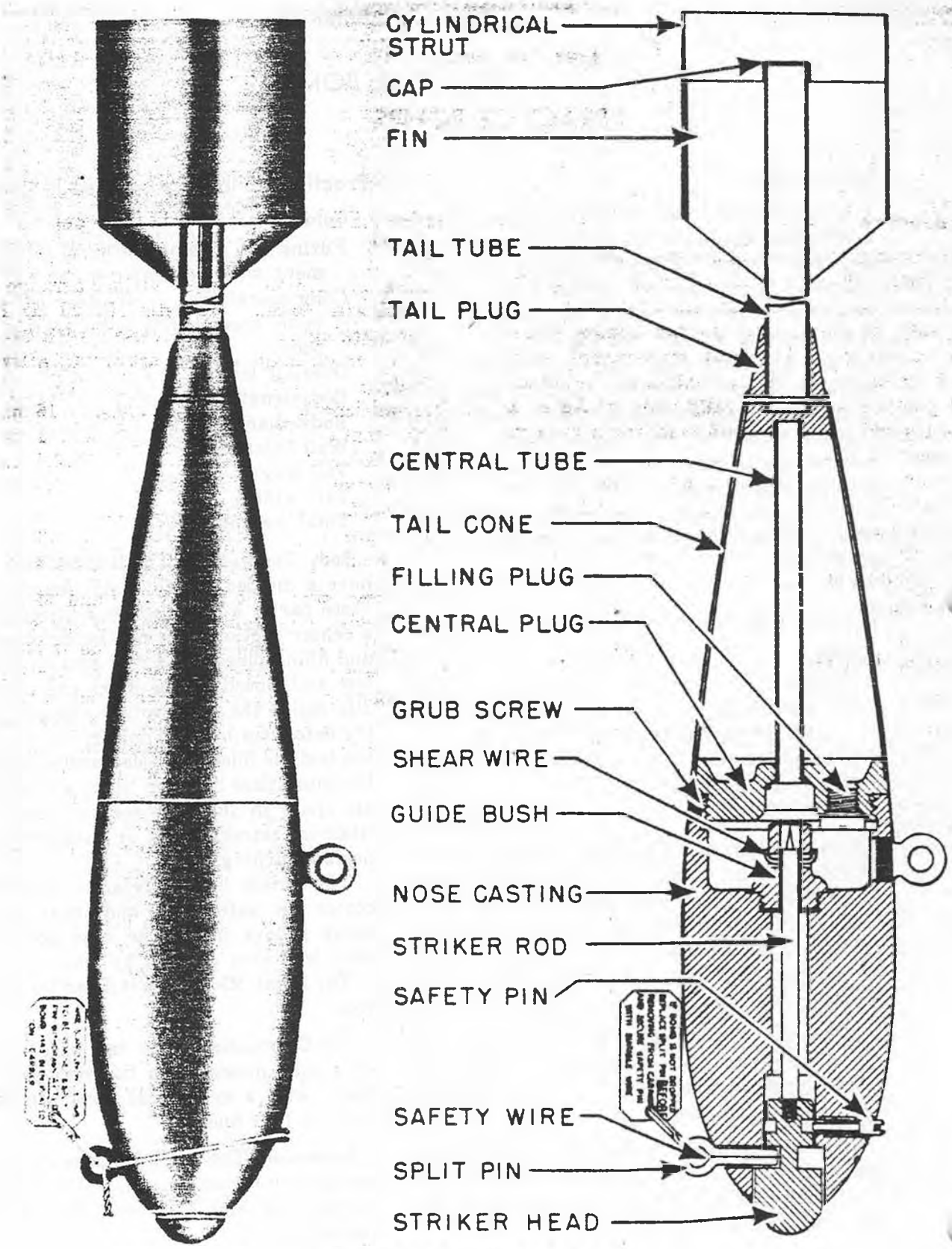


Figure 56—Practice 10-lb. Bomb

Explosive Components

Detonator burster—No. 28 Mk I consists of 10 grains fulminate of mercury and 7 C.E. pellets.

Main filling—Bombs Mk I and Mk II contain titanium tetrachloride, which, when exposed to the atmosphere, forms a cloud of white smoke, marking the point of impact. The Bomb Mk III has a flash filling consisting of gunpowder, and magnesium turnings.

Remarks: This bomb is designed for use against certain targets where a bomb is required to break on impact without causing damage to the target. Because of its low terminal velocity, the bomb is only suitable for low-altitude bombing.

The Bombs Mk I and Mk II have smoke charges for day use, while the Mk III has a flash filling for night use.

Practice 10-lb. Mk I (Service), Mk II (Obsolete), and Mk III (Service)

Data

Fuzing....Simple, integral striker assembly with Detonator Burster No. 28 Mk I
Color markings.....White over-all; 2 light green bands ½ in. wide around tail cone
Over-all length .....18 in.
Body diameter .....3 in.
Wall thickness .....Solid body
Total weight .....10 lb.

Body Construction: The bomb has a solid cast-iron nose with an axial bore housing the striker head and rod, with a guide bush threaded into the rear cavity, and internal rear threads to take the central plug. The striker is retained by a cotter pin (removed when loaded on aircraft), safety pin, and shear wire extending through the striker rod and guide bush. The central plug houses the central burster tube.

Tail Construction: The tail cone is closed at the rear by a conical tail plug, and at the front end by the central plug to which it is attached. The central tube extends through the tail cone to the tail plug, and holds the detonator burster. A tapped hole, fitted with a plug, is provided in the central plug for filling. The tail tube, with four fins carrying a cylindrical strut, projects from tail plug. Its rear end is closed by a cap.

Suspension: The bomb is suspended by a single eyebolt, which screws into the bomb body opposite the cavity for suspension from a Light Series bomb carrier.

Explosive Components

Detonator burster—10 grains fulminate of mercury and 7 C.E. pellets.

Smoke filling, Mk I—1 lb. Titanium Tetrachloride, which forms a white cloud on exposure to atmosphere.

Flash filling, Mk III—1 lb. mixture of gunpowder and magnesium turnings, which causes a brilliant white flash on detonation.

Remarks: The Bomb Mk I with its smoke filling is used for daytime practice operations. The Bomb Mk III with its flash filling is used at night. These bombs, because of the solid iron nose, should not be used against lightly armored targets.

Mk II had a plastic tail, but was not satisfactory; so all were scrapped.

Practice 11.5-lb. Mk I (Service), and Mk II (Obsolete)

Data

Fuzing.....Simple integral striker assembly with Detonator Burster No. 28 Mk I
Color markings....White over-all; two ½-in. green bands ½ in. apart around after body
Over-all length .....18 in.
Body diameter .....3 in.
Tail width .....3 in.
Total weight .....11.5 lb.

Body Construction: The bomb consists of a nose casting, fitted with a striker assembly and a tail cone which constitutes a container for the filling, and is fitted with a central tube for a detonator burster. The nose casting is made of iron, internally threaded at the rear to receive the spigot portion of a central plug which closes the forward end of the tail cone. The interior of the nose is filled with lead, and has a clearance hole for the striker rod. The striker is secured by a cotter pin (removed when loaded), a safety pin spring-loaded outward, and a shear wire through the guide bush.

Tail Construction: The sheet-metal tail cone, constituting the container for the filling, is

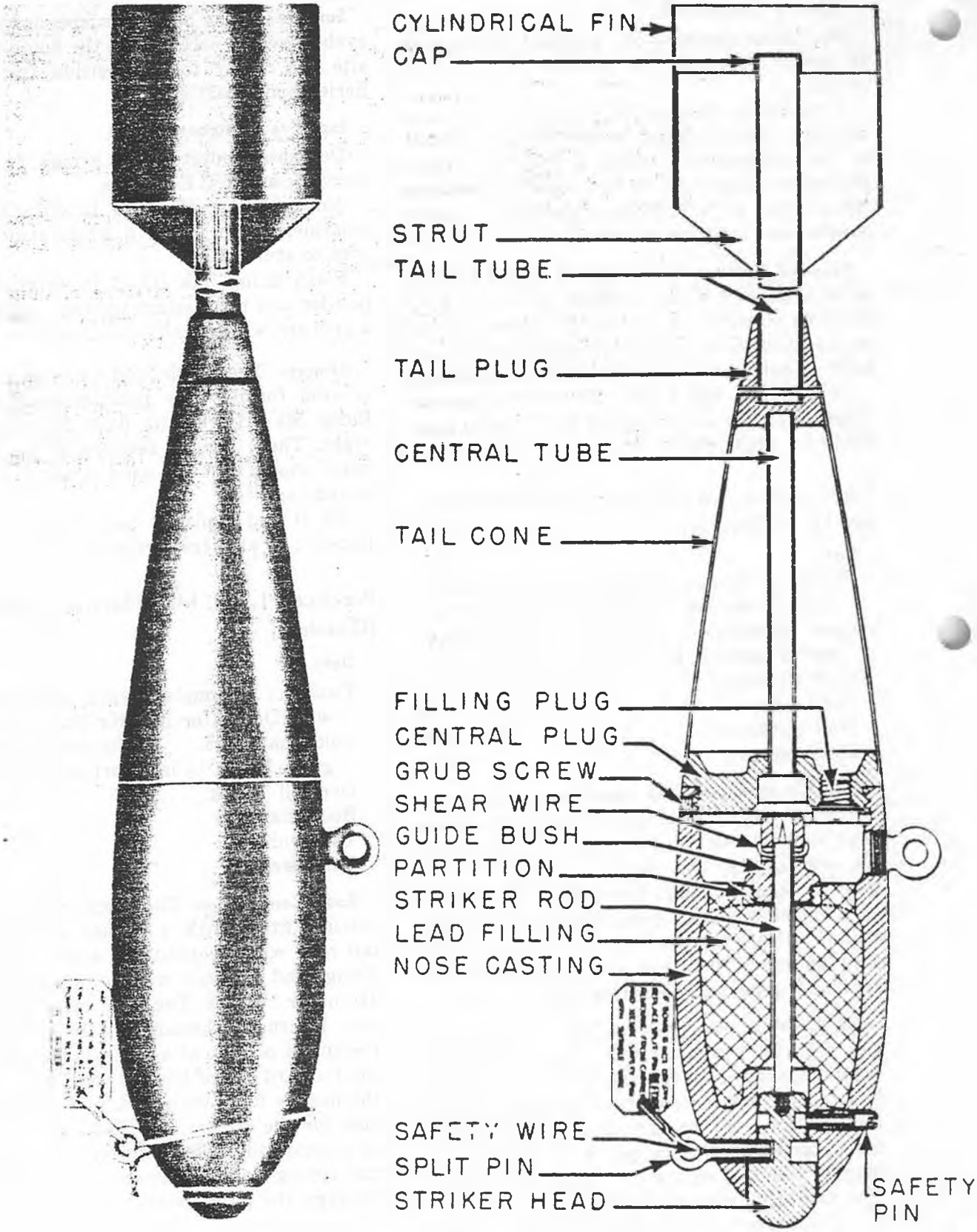


Figure 57—Practice 11.5-lb. Bomb

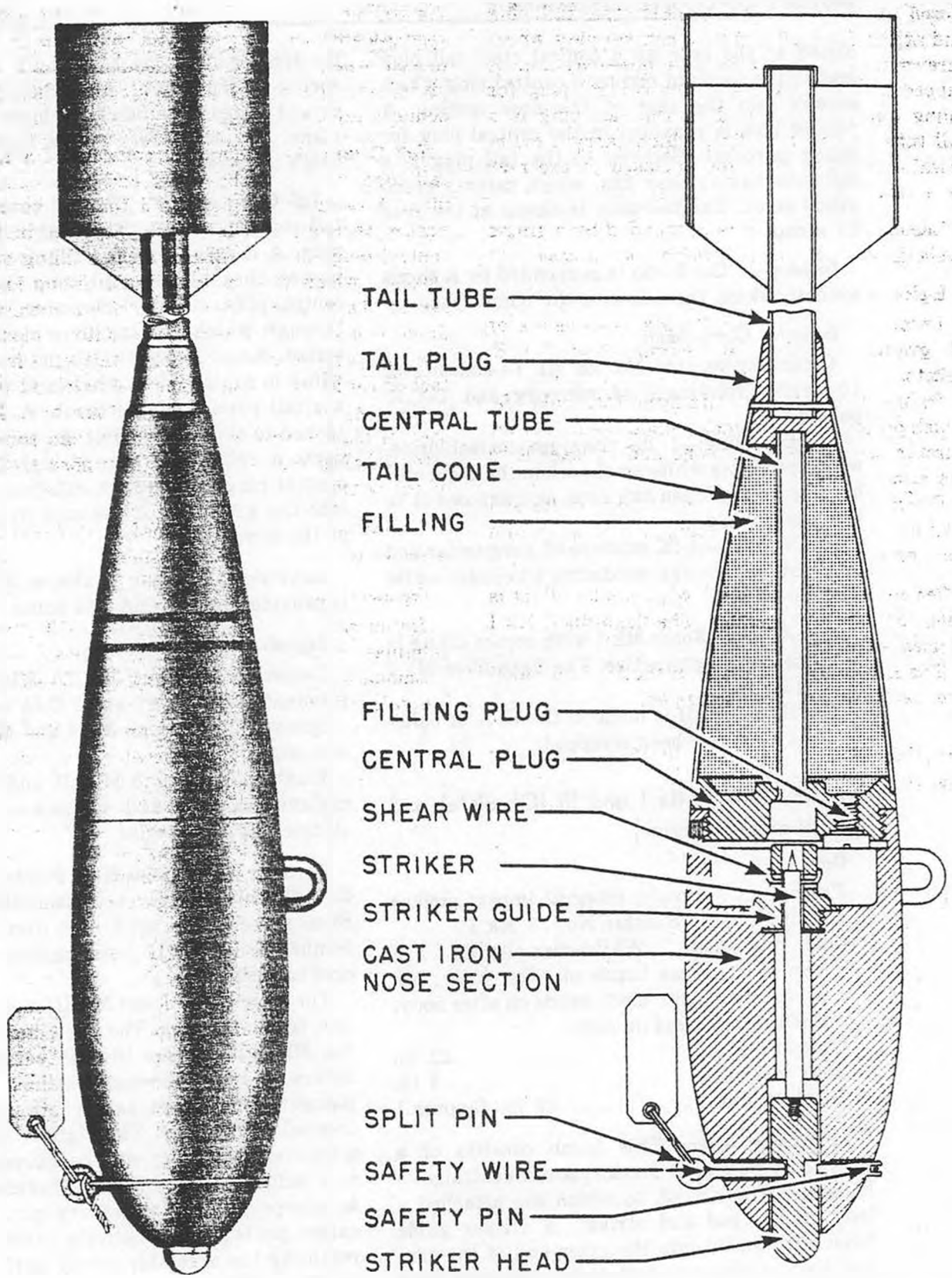


Figure 58—Practice 25-lb. Bomb

closed at the rear by a conical steel tail plug and at the forward end by a central plug which screws into the rear of the nose casting. A tapped hole is provided in the central plug for filling purposes. Secured to the tail plug is a tail tube having four fins, which carry a cylindrical strut. The tail tube is closed at the rear by a cap.

Suspension: The bomb is suspended by a single eyebolt, which threads into the bomb case.

Explosive Components

Detonator-burster No. 28 Mk I—consists of 10 grains fulminate of mercury and 7 C.E. pellets.

Smoke filling—1 lb. titanium tetrachloride, which produces white smoke when the detonator burster breaks open tail cone and exposes it to the atmosphere.

Flash filling—1 lb. mixture of gunpowder and magnesium turnings, producing a brilliant white flash on impact.

Remarks: The Bomb Mk I with smoke filling is used for daytime practice. The flash-filled Mk I is used at night.

The Bomb Mk II is made in the U. S. of bakelite, but have now been scrapped.

Practice 25-lb. Mks I and III (Obsolete) and Mks IV and V (Service)

Data

Fuzing.....Simple, integral impact striker with Detonator Burster No. 28 Mk I
Color markings....White over-all; Mk I has two ½-in. green bands on after body; Mk III has two ½-in. black bands on after body, and one red band on nose.
Over-all length .....22 in.
Body diameter .....4 in.
Total weight.....25 lb. (approx.)

Body Construction: This bomb consists of a solid, cast-iron nose section bored centrally to house a striker head, to which are attached a long striker rod and striker. A striker guide bush is threaded into the after end of the central bore. A shear wire through the guide bush and the striker prevents the striker from contact with the detonator burster in the unarmed position. During transit and normal handling, the striker also is retained by a split pin and a spring-loaded safety pin. The split pin is removed when the bomb is loaded aboard the plane, and the safety pin is ejected when the bomb is released.

Tail Construction: The tail consists of a long tail cone, closed at the wider end by a central plug. A central tube for the detonator burster passes through the tail cone. Located in the central plug, slightly off-center, is a filling plug through which the smoke or flash filling is inserted. As in most British practice bombs, the filling is contained in what is actually a part of the tail portion of the bomb. A tail tube is attached to the after end of the tail cone and supports a cylindrical shroud and four fins. The central plug is threaded externally and screws into the after end of the cast iron nose section of the bomb.

Suspension: A single U-shaped suspension lug is provided to suspend this bomb.

Explosive Components

Detonator Burster No. 28 Mk I—10 grains fulminate of mercury and 7 C.E. pellets

Smoke filling, Bomb Mk I and Mk IV—Titanium tetrachloride

Flash filling, Bomb Mk III and Mk V—Magnesium shavings and gunpowder, or calcium silicide and gunpowder.

Remarks: The smoke-filled bombs are used for daylight operations; the flash-filled at night. Because of their solid cast-iron noses, these bombs should not be used against lightly armored targets.

The Bombs Mk I and Mk III are identical, except for the fillings. The Mk IV, which replaces the Mk I, is similar to it in construction, but differs in the following respects: The safety plunger and transit safety pin have been increased in diameter. The plunger is retained by a flexible steel safety wire permanently attached to a safety collar which is threaded internally to accept the transit safety pin. The transit safety pin is screwed into the safety collar, thus retaining the assembly firmly until the bomb is on the carrier.

The Bomb Mk V which replaces the Mk III, is mechanically identical to the Mk IV, but differs in the filling.

INFANTRY TRAINING BOMBS

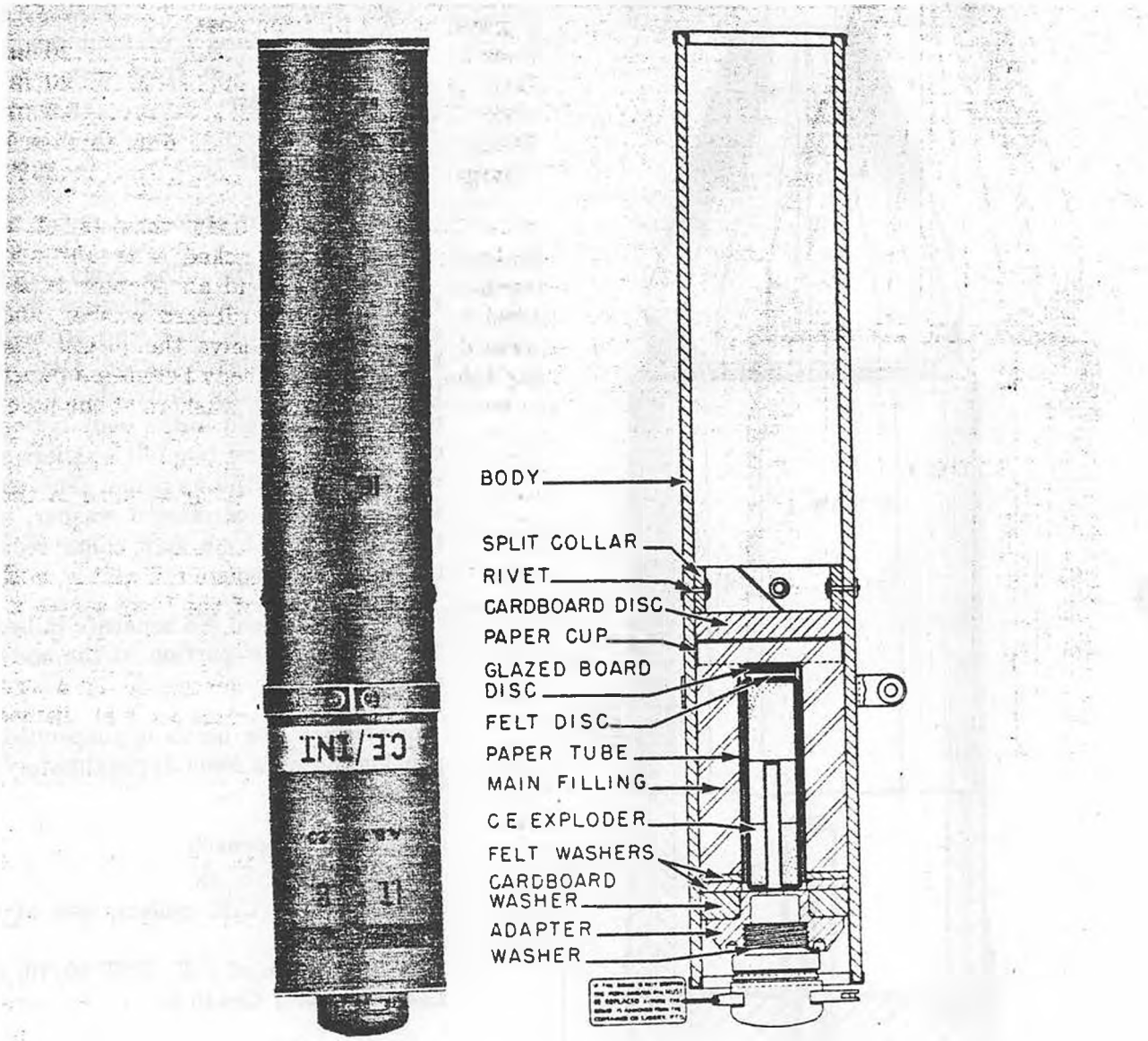


Figure 59—I.T. 6-lb. Bomb Mk I

Introduction

These bombs, of which there are two sizes, are used to train infantry units under simulated combat conditions. The bomb casing is splinterless, thus reducing the possibility of training injuries, but the noise and flash produced are comparable to those of the explosions of a medium-sized bomb.

The bombs are fuzed with a pistol/detonator combination. The 6-lb. bomb takes a Nose Pistol No. 34, while the 60-lb. bomb takes a Nose Pistol No. 42.

The bomb bodies are constructed of rolled pressed paper, and are closed by a pressed-paper head.

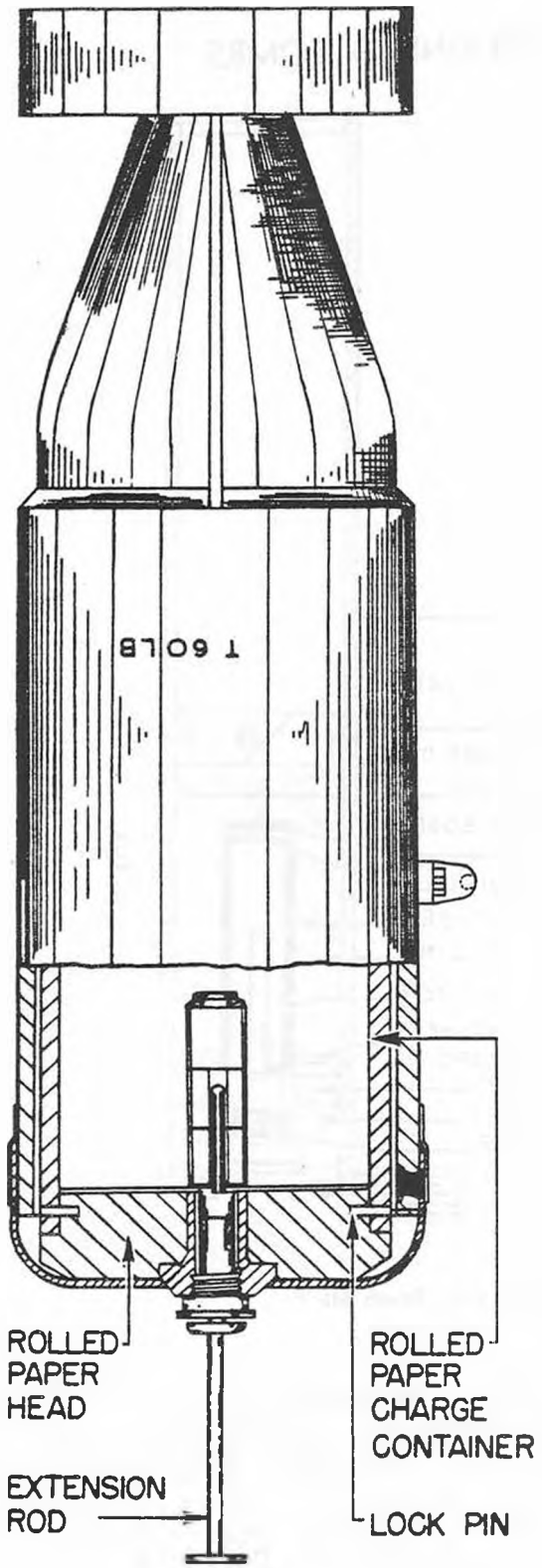


Figure 60—I.T. 60-lb. Bomb

I.T. 6-lb. Mk I (Service)

Data

Fuzing.....Nose Pistol No. 34
Color markings.....Dark green over-all; ½-in. red band 1 in. from nose; 1-in. light green band 4 in. from nose
Over-all length .....20 in.
Body length .....20 in.
Body diameter .....3.8 in.
Total weight .....6 lb. (approx.)
Charge/weight ratio 33%

Body Construction: The body consists of a rolled-paper cylinder shellacked internally and externally. At the nose end an adapter is attached to a chamfered cardboard washer, and threaded internally to receive the pistol. The main filling is held in the body between a paper cup amidships and two felt washers at the nose, which position the exploder. The paper cup is supported by a cardboard washer, which is in turn supported by a split collar secured to the body by four rivets.

Tail Construction: No separate tail unit is used. The empty after portion of the body serves as a tail.

Suspension: The bomb is suspended by a suspension lug on a band approximately six inches from the nose.

Explosive Components

Detonator—No. 43
Exploder—3 C.E. pellets, two of which are perforated
Filling—2 lb. of C.E. TNT 30/70, or desensitized Pentolite Grade I

Remarks: This bomb is used to provide realistic bombing attacks on infantry undergoing training. The bomb is splinterless, but the noise and flash are comparable to those of a medium-sized bomb used for dive bombing operations.

I.T. 60-lb. (Service)

Data

Fuzing.....Nose Pistol No. 42
Color markings.....Dark green over-½-in. red band and 1-in. light green band around forward part of body

Over-all length.....36 in. (without fuze extension rod)
Body diameter .....10.6 in.
Total weight .....60 lb. (approx.)

Body Construction: The body and tail unit are in one piece, and are manufactured of rolled and pressed paper. The rolled-paper charge container, containing pentolite, rests on a felt washer seated on a diaphragm in the body. The head of the charge container is closed by a rolled-paper head which is pinned, shellacked, and taped in position. The head is recessed to house the pistol adapter. A 6-in. extension rod is fitted to the Nose Pistol No. 42, by means of a spring washer, after the arming vane cap has been removed.

Suspension: The bomb is suspended by a single suspension lug approximately 10 in. from nose of bomb, which is secured to the bomb body by two bolts.

Explosive Components

Detonator — No. 52, non-delay, A.S.A. and C.E. pellets
Exploder—3 C.E. pellets
Filling—Pentolite

Remarks: This bomb is designed to be used in training operations of ground personnel, simulating realistic bombing attacks.

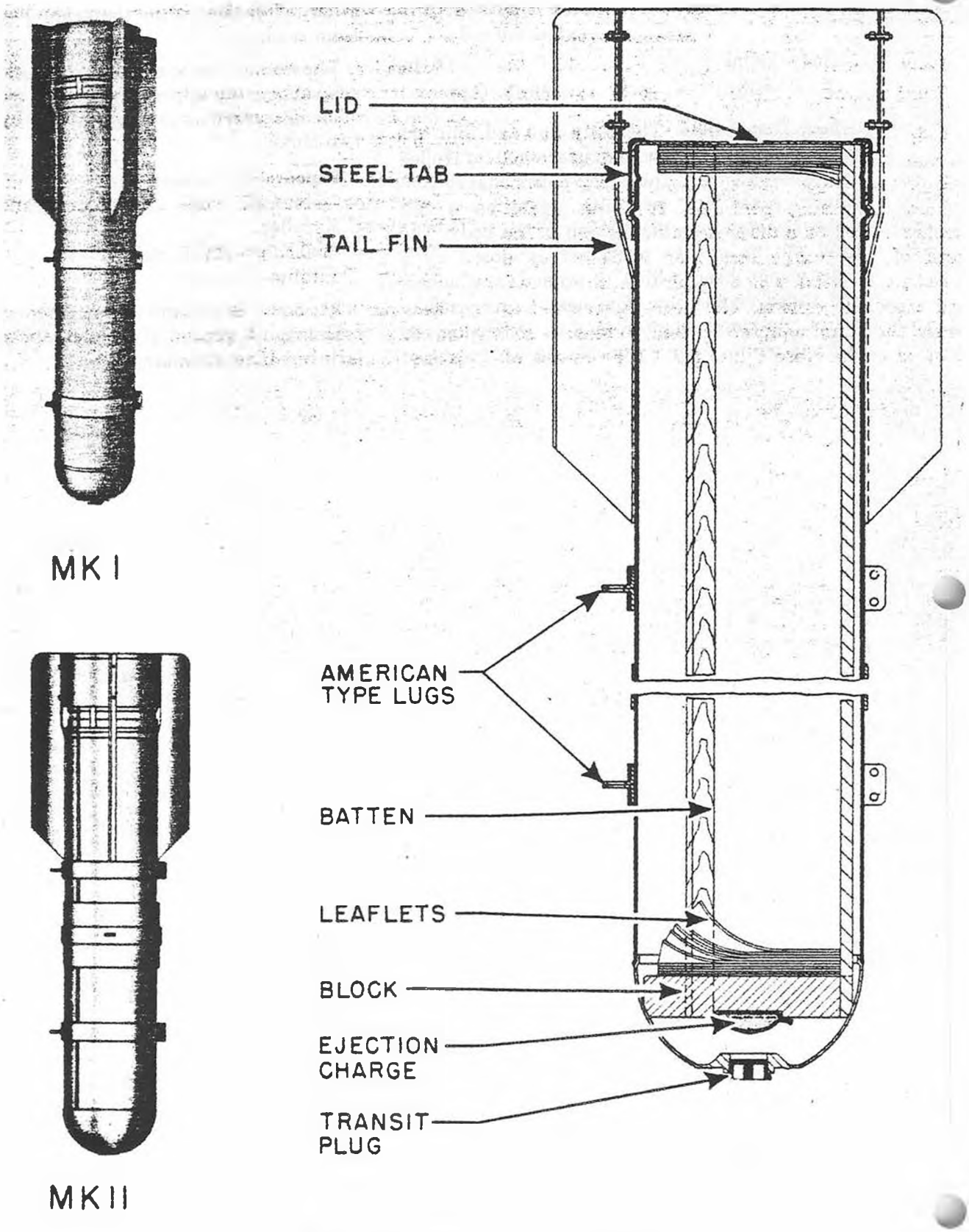


Figure 61—"Nickle" Leaflet Bomb No. 2

MISCELLANEOUS BOMBS

Introduction

This chapter covers two bombs which do not fall within the regular classification system. One bomb is the "Nickle" Leaflet bomb, which is a U. S. Army M26 flare modified to carry propaganda leaflets. The other bomb is the Type H, A.D. Apparatus, which is designed to provide aircraft with a defense against fixed gun fighter planes by laying a parachute-supported aerial mine in their path. It is similar in principle of operation to several of the rocket-propelled A.D. apparatus.

"Nickle" Leaflet Bomb No. 2 Mks I and II (Service)

Data

Fuzing.....Nose Fuze No. 860 Mk II
Color markings.....Grey over-all; white stencilling
Over-all length .....47 in.
Body diameter .....8 in.
Total weight .....64 lb.
Filling .....Propaganda leaflets

Body Construction: This bomb is an adaptation of a U. S. Army Flare M26, whose purpose is to scatter large quantities of propaganda leaflets over enemy occupied territory.

The bomb consists of a light sheet-steel body, closed at the front end by a plastic transit plug, and at the after end by a light sheet-steel lid. When the bomb is filled and ready for use, this lid is held in place by four soft steel tabs, which are welded at one end to the bomb body and have their free ends bent over the lid. Four tail fins are secured to the after end of the bomb casing.

Inside the body is a wooden frame consisting of a block, which fits snugly in the nose of the bomb but does not completely fill it, and three equispaced battens, each of which is secured at one end to the block. These battens extend the full length of the bomb body between the block and the lid. The leaflets are contained in the wooden frame between the battens. The outer end of the block is recessed to locate an ejection charge containing 400 grains of G.12 gunpowder held in a muslin bag.

Since the bomb is an American weapon, it must be somewhat modified for British use. A special brass adapter is threaded into the nose fuze pocket. The adapter is internally threaded to receive the larger Fuze No. 860 Mk II. In the base of the adapter is located a charge of G.12 gunpowder, sealed at either end by a waterproof disc.

Suspension: The Bomb Mk I is designed only for aircraft having American-type bomb stowage. It is fitted with two American type lugs attached to suspension bands around the bomb body. The Bomb Mk II is designed for suspension only in a Universal-type bomb carrier. The bomb is fitted with both British- and American-type suspension lugs, but the American lugs have been moved out of position to fit beneath the standard crutching forks of the Universal-type carrier, and act as strengthening bands for the light-gauge steel body.

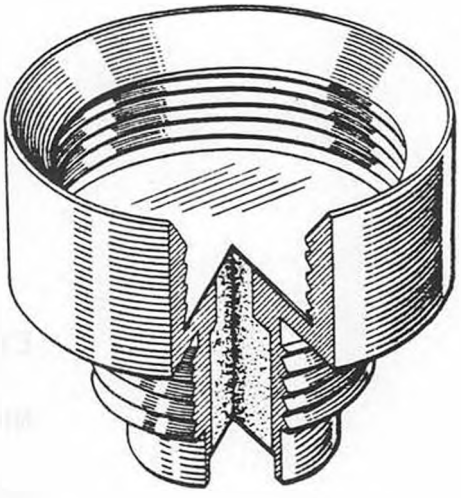


Figure 62—Fuze adapter for "Nickle" Leaflet Bomb

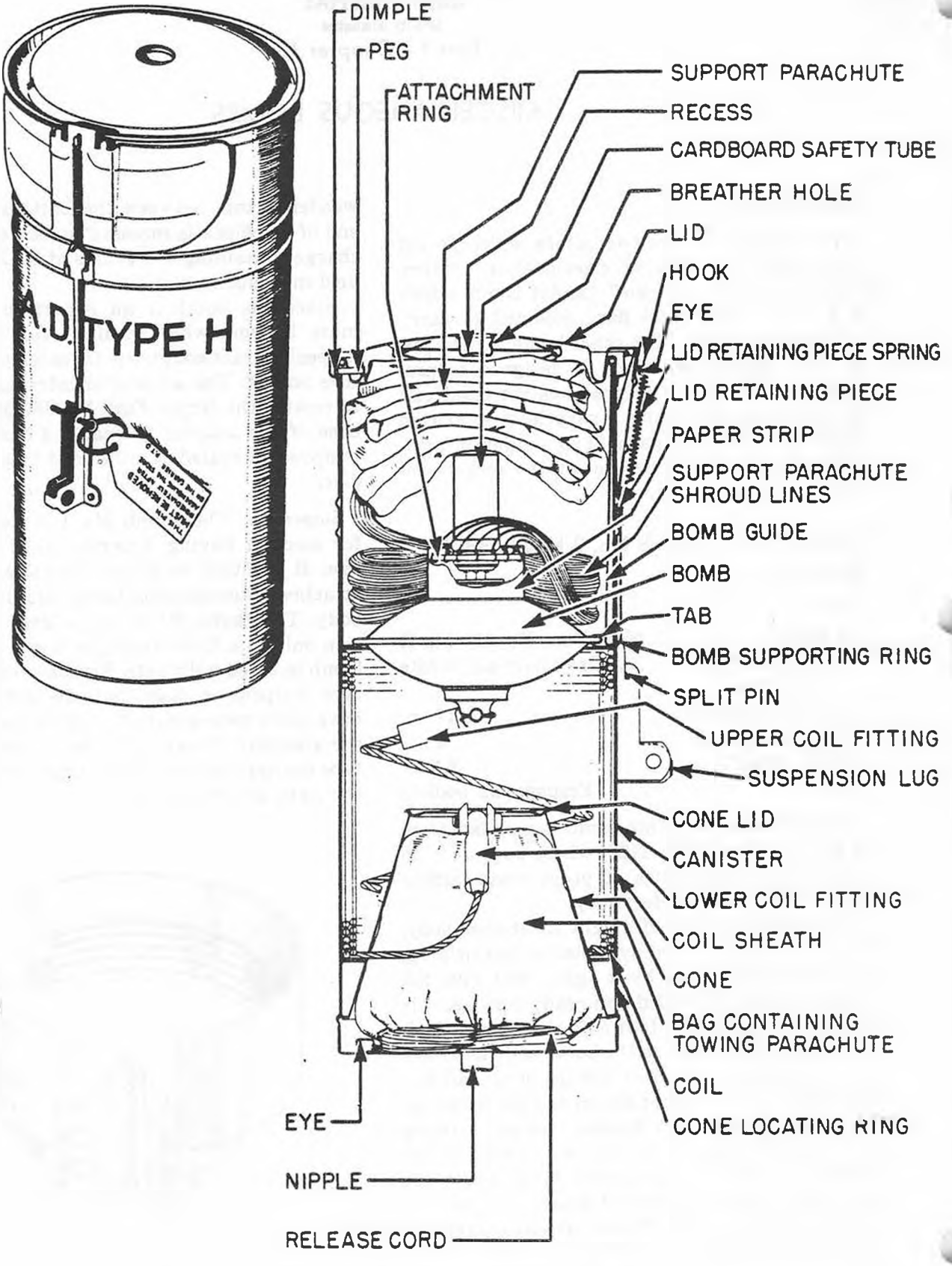


Figure 63—Type H., A.D. Apparatus Mk II

Functioning: When the fuzed bomb is released from the plane, it falls freely until the fuze functions, and the gunpowder in the adapter is initiated. The flash from the gunpowder ignites the ejection charge, and the pressure from the explosion of the ejection charge forces the wooden frame containing the leaflets out of the after end of the bomb body. The lid is thrown clear and the contents ejected from the tail. After the ejection, the wooden frame falls end-over-end, and the leaflets fall out of the frame and scatter over the target.

Type H, A.D. Apparatus Mk II (Service)

Description: The apparatus consists of a housing cannister, support parachute, bomb, steel cable, and towing parachute.

The cylindrical housing cannister is a metal tube, the open end of which is closed by a lid. A hinged metal flap is attached to the lid to insure its release when the apparatus is dropped. A lid-retaining assembly holds the lid and its flap in place until the bomb is dropped.

The support parachute's shroud lines are tied to an attachment ring which is connected to the double snatch link of the bomb fuze by circlips.

The discus-shaped bomb has a central fuze hole, and a rolled edge to facilitate penetration. The fuze is secured in place by a nut. The bomb is filled with C.E./TNT.

The fuze incorporates an all-ways acting striker mechanism, a double snatch link, and a C.E. filled magazine, which is screwed into the base of the fuze and closed by a plug. This plug has an eye to which the cable is attached. The fuze body houses a striker, creep spring, and shutter. When the detonator in the shutter is held out of line with the striker by the striker point engaging a hole in the shutter, the fuze is unarmed. If the striker point is withdrawn from this hole, the shutter is moved into place by its spring and held in alignment by a spring-loaded locking pawl. The striker is retained in the shutter hole against the pressure of its creep spring by a safety plunger, which is retained in position in the actuating rod by a headed rod. A shear wire and the upper balls of the snatch link connect the headed rod and the actuating rod. The flanged head of the actuating rod is housed in the fuze body.

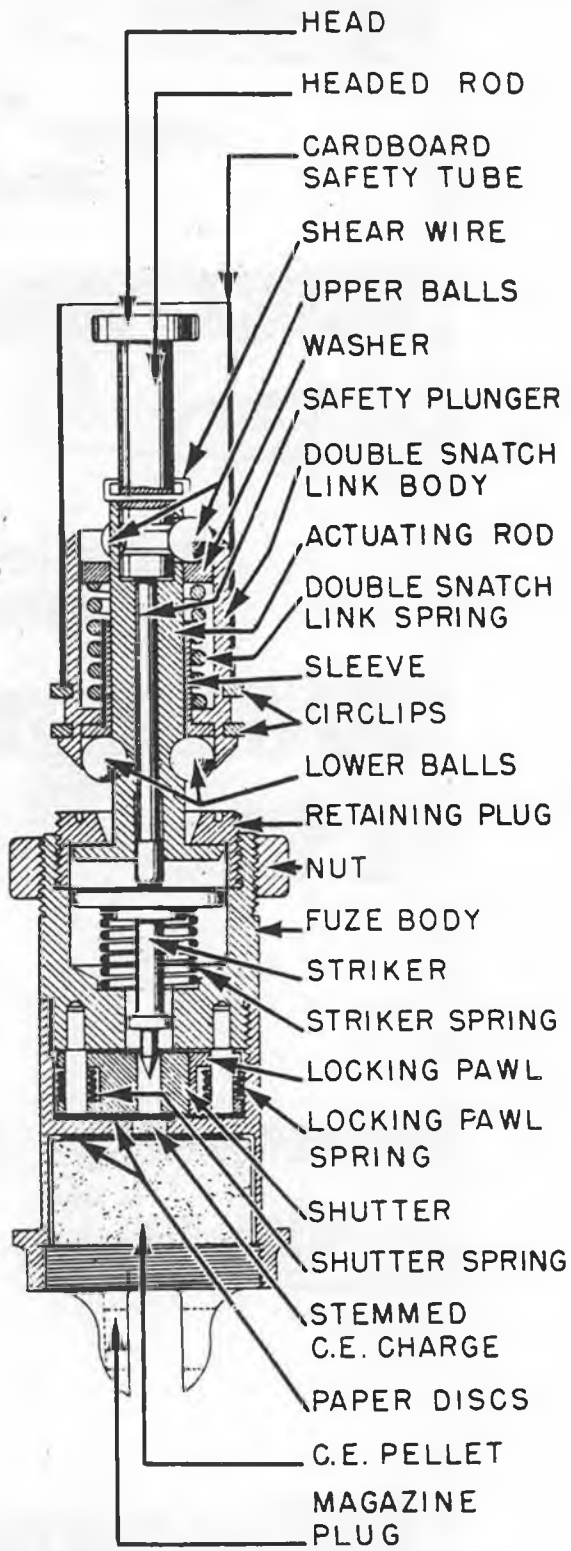
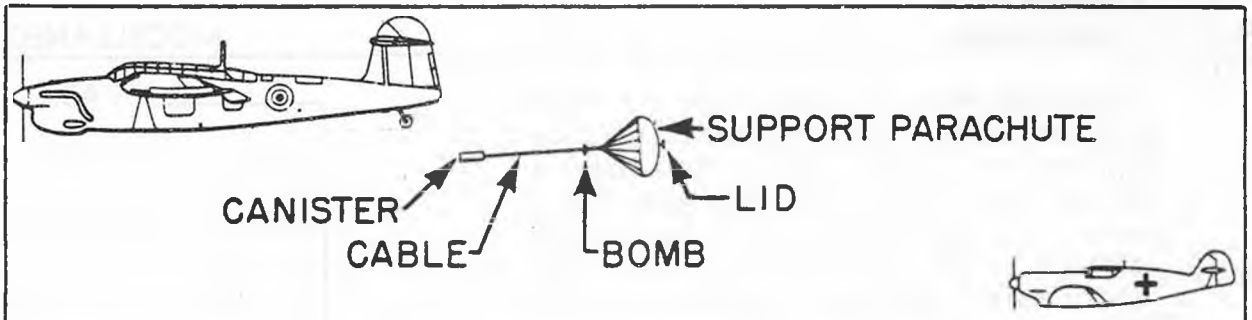
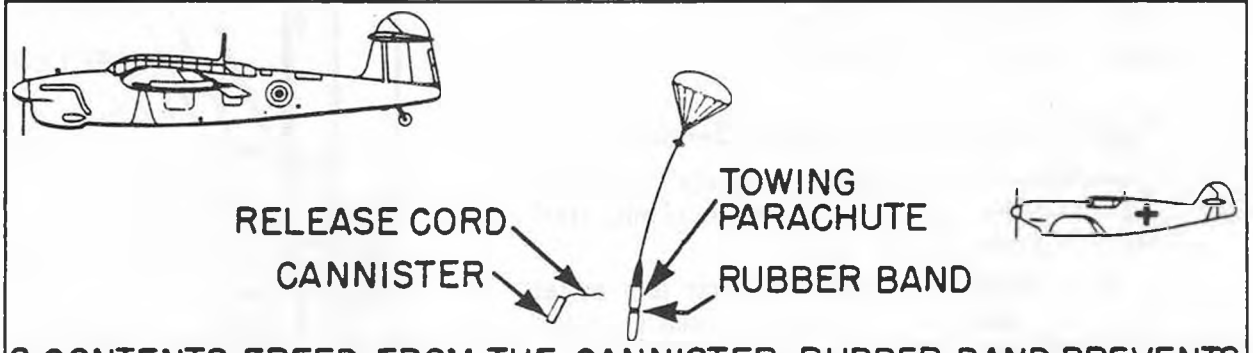


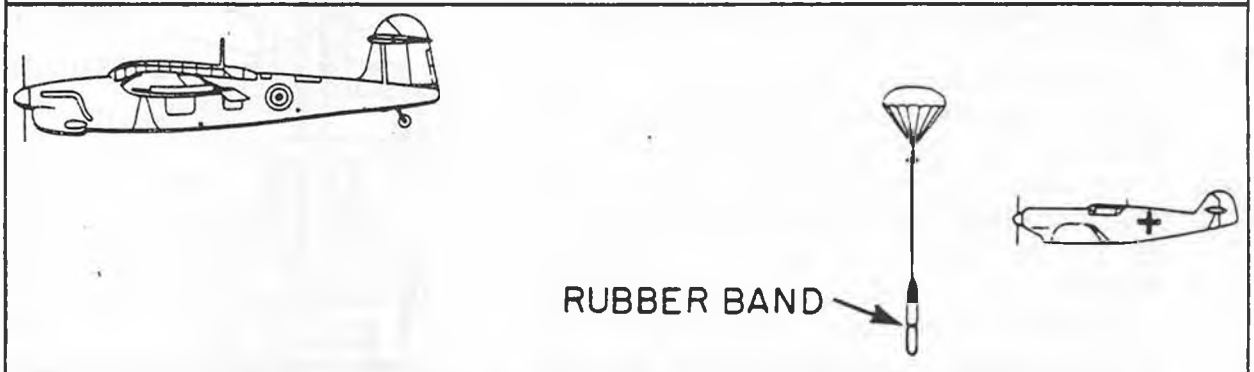
Figure 64—Special H.E. bomb fuze and double snatch link for Type H., A.D. Apparatus



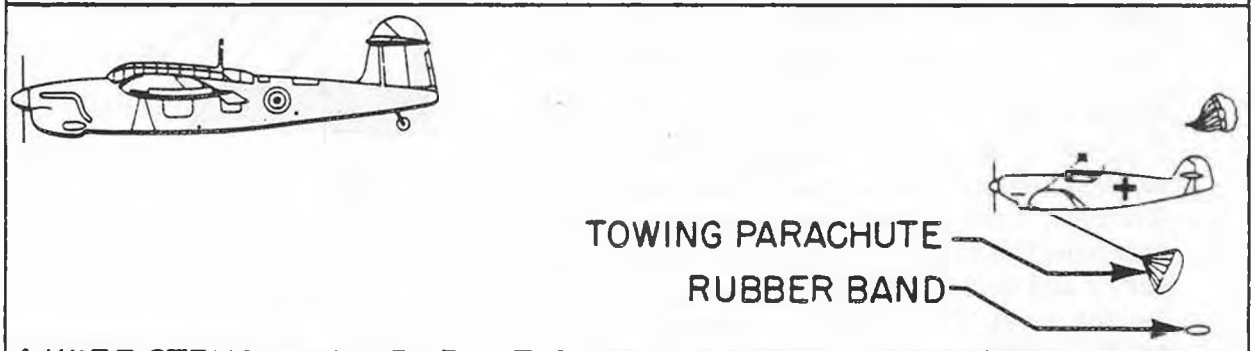
1. CONTENTS WITHDRAWN FROM THE CANNISTER SHORTLY AFTER THE APPARATUS IS DROPPED.



2. CONTENTS FREED FROM THE CANNISTER. RUBBER BAND PREVENTS OPENING OF THE TOWING PARACHUTE.



3. APPARATUS ASSUMES ITS VERTICAL OPERATING POSITION.



4. WIRE STRUCK BY AIRCRAFT. SUPPORT PARACHUTE SEPARATES FROM THE ASSEMBLY, AND TOWING PARACHUTE OPENS.

Figure 65—Operating sequence of the Type H., A.D. Apparatus

The double snatch link consists of a body housing the actuating rod, which carries an upper and lower set of balls, a washer, sleeve, and compressed spring. The upper balls bear on the washer, which presses against the upper end of the spring, and the lower set of balls bear against the under side of the flanged end of the sleeve. The parachute attachment ring is joined to the snatch link body by two circlips.

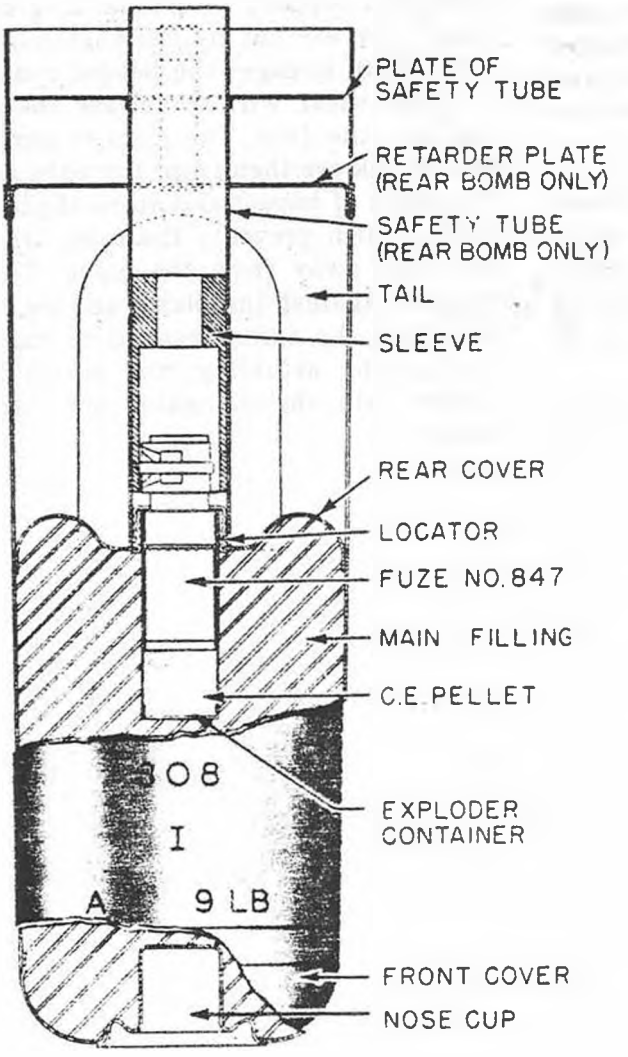
The support parachute, which is packed and held together with rubber bands so it will open only on sharp impact, is attached to the fuze eye by a one hundred foot cable.

Functioning: When the apparatus is released from the plane, the lid is blown off and, acting as a pilot chute, withdraws the support parachute, followed by the bomb, cable, and towing parachute. The cannister falls away and the cable assumes a vertical position.

The opening of the support parachute imparts a jerk to the double snatch link, which then releases the lower set of balls. When the cable is completely unwound, the upper set of balls is ejected and the juncture of the fuze to the support parachute is transferred to the shear wire.

When the pursuing enemy plane collides with the cable, another jerk is transmitted to the bomb and support parachute. The ends of the shear wire are cut by the snatch-link washer, which then engages the headed rod, and again cuts the shear wire to release the safety rod and arm the fuze. The support parachute and snatch link are then freed from the assemblage. The shock of impact also opens the towing parachute, which prevents the cable from slipping over and away from the plane. The bomb is whipped against the plane, and its hard edges penetrate the skin. Penetration causes deflection of the actuating rod, which forces the striker into the detonator and explodes the bomb.

OBSOLETE BOMBS



Introduction

The various bombs of different types included in this section have all been declared obsolete, but because of the possibility that they still may be encountered, it is deemed desirable to give complete information regarding them.

Older obsolete bombs, included only as a matter of interest, are listed in chart form at the end of the chapter.

A.T. 9-lb. Mk I (Obsolete)

Data

Fuzing.....Tail Fuze No. 847
Color markings.....Dark green over-all; ½-in. red band around nose
Over-all length .....14 in.
Max. body diameter.....4½ in. sq.
Total weight .....8.5 lb.
Charge/weight ratio 80%

Body Construction: The body is made of thin metal, approximately rectangular in shape, having a square cross section with rounded corners. It tapers slightly from the rear toward the nose. The body is closed at the nose end by a front cover housing a nose cup, which is taped and cemented in place. The nose cup of the re bomb forms a safety device for the fuze in the front bomb of a pair, as bombs are dropped in pairs. The rear cover is located approximately in the middle of the bomb. The bomb incorporates a steel, cone-shaped charge.

Tail Construction: The tail is integral with the body, being only a continuation of the thin metal case. The rear bomb of a pair has a retarder plate to pull the rear bomb free of the front one when dropped from the container. The tail also has a safety tube of light-gauge metal with a cardboard inner sleeve, forming a safety device for the fuze of the rear bomb of a pair. A locating plate near the rear of the safety tube locates the tube in the tail of the bomb.

Suspension: These bombs are carried in the 250-lb. Small Bomb Container, which holds 24 bombs. They are loaded in pairs, with the nose of the rear bomb housed in the tail of the front bomb.

Explosive Components

Exploder—C.E. pellet housed in the bottom of the exploder container

Filling—Nobel's explosive No. 808, with shaped charge effect

Remarks: The bomb is designed for use against tanks and armored vehicles. It will blow a hole approximately nine inches in diameter in armor plating 2 in. thick, and is effective at striking angles up to 45 degrees.

The 9-lb. A.T. Practice Bomb Mk I is approximately the same shape, size, and filled weight, and has the same approximate ballistic characteristics. However, it has neither exploder nor detonator. Its body breaks up on impact with the target to release a white filling, clearly visible from the air.

H.E. 20-lb. Mk I (Obsolete)

Data

Fuzing .....Nose Pistol No. 16
Color markings.....Dark green over-all; ½-in. red band and 1-in. light green band around nose
Over-all length .....25 in.
Body length.....11 in. (approx., without tail adapter)
Body diameter .....5.175 in.
Tail length.....12 in. (approx.) with tail adapter
Tail width .....6 in. (approx.)
Total weight .....27 lb. (approx.)
Charge/weight ratio .....20% (approx.)

Body Construction: The bomb has a steel, semi-steel, or malleable-iron body, hollow and open at both ends, with the forward end threaded internally to receive the nose adapter, and the after end internally threaded to take the tail adapter. The nose adapter has three different-sized threads, to take the detonator holder and the exploder container from the rear, and the pistol from the front. The flange of the nose adapter is externally threaded to receive a screw-on pistol cover. The tail adapter is tapered to conform to the rearward streamlining of the body, with a central bore threaded to receive the tail rod.

Tail Construction: The bomb has a wooden tail cone, conforming to the streamlined shape of the body. Two diametrical saw-cuts at right angles extend from the after end, over a slightly greater length than that of the tail vanes, to accommodate the four sheet-metal tail vanes, which are made in integral pairs. The tail cone is bored axially to take the tail rod, and fits into the cavity in the tail adapter.

Suspension: A wrought-iron or mild steel suspension lug is riveted to the bomb body.

Explosive Components

Detonator — Non-delay, fulminate composition and 2 C.E. pellets

Exploder—3 solid and 1 perforated C.E. pellets

Filling—5 lb. (approx.) TNT

Remarks: This bomb was intended for attacking personnel, air strips, and road transports.

R.L. 112-lb. Mks V, VI, and VIII (Obsolete)

Data

Fuzing.....Nose Pistol No. 8 Mk I, or Nose Pistol No. 19 Mks I and II; Tail Pistol No. 5B Mks I and II
Color markings.....Yellow over-all; ½-in. red band around nose and 1-in. light green band around body
Over-all length .....29.0 in.
Body length .....25.3 in.
Body diameter .....9.0 in.
Wall thickness .....0.8 in.
Tail width .....18 in.
Total weight .....126.0 lb.
Charge/weight ratio 16.7%

Body Construction: The body of these bombs is a single streamlined casting, steel for Mks V and VII and iron for Mk VI, threaded at the nose and tail to take adapters for the central exploder tube.

Tail Construction—Mk V: The tail of the Bomb Mk V consists of four tail fins, which fit over the body and are fastened in place with screws. Two sets of box-type struts reinforce the tail fins.

Tail Construction—Mks VI and VII: The tail assembly of the Bombs Mk VI and Mk VII consists of a tail cone, which slides over the after end of the bomb body and is secured by a locknut on the exploder tube. Four tail fins are riveted on the cone and are held in place by two sets of box-type struts.

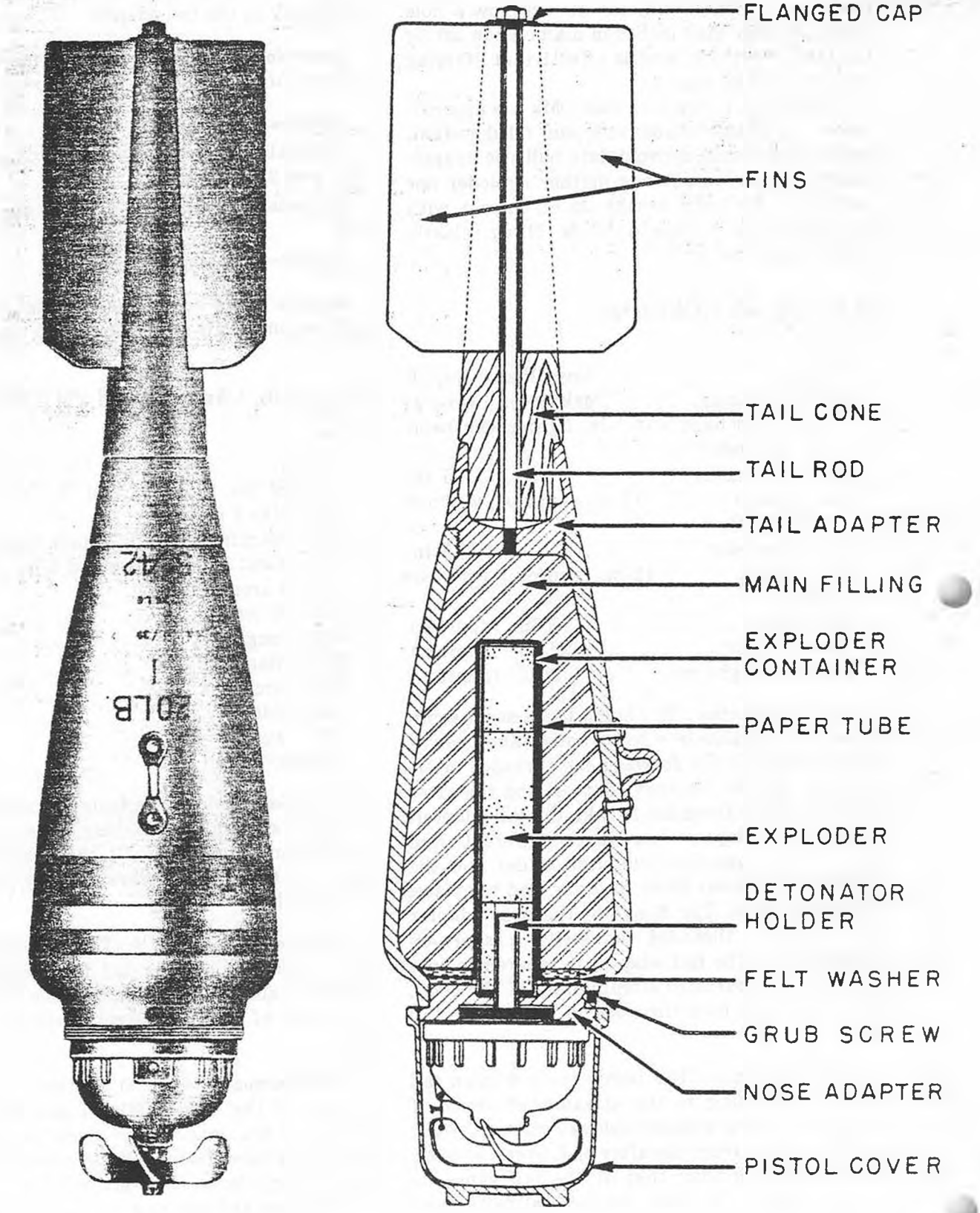


Figure 67—H. E. 20-lb. Bomb Mk I

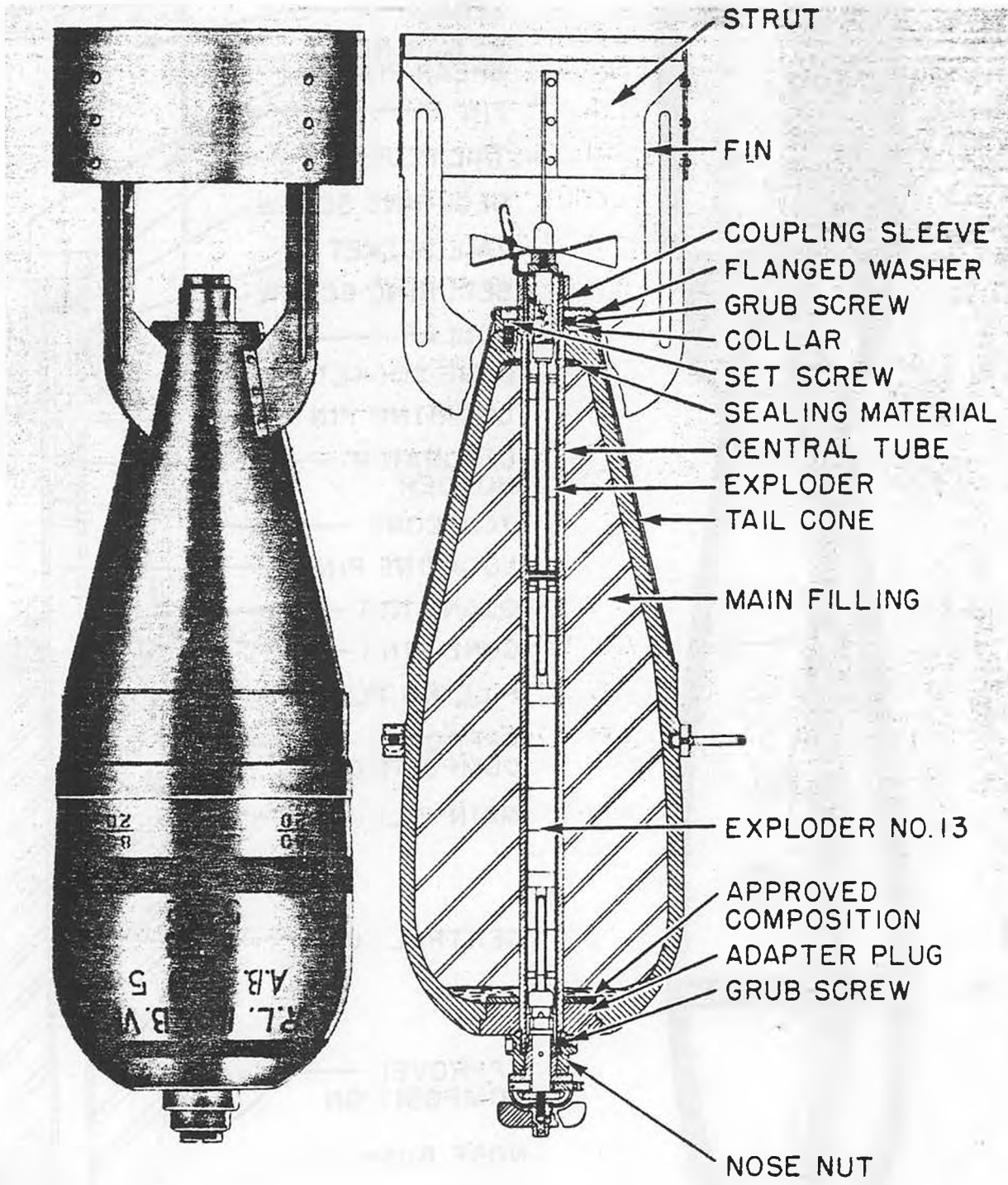


Figure 68—R.L. 112-lb. Bomb

Suspension: The Bomb Mk V has a U-shaped eye-bolt secured to the body with screws at the center of gravity.

The Bombs Mk VI and Mk VII have a U-shaped eye-bolt fastened to a suspension band around the center of gravity.

Explosive Components

Detonators—Instantaneous

Exploders—TNT and C.E. pellets

Filling—Amatol 80/20, or TNT

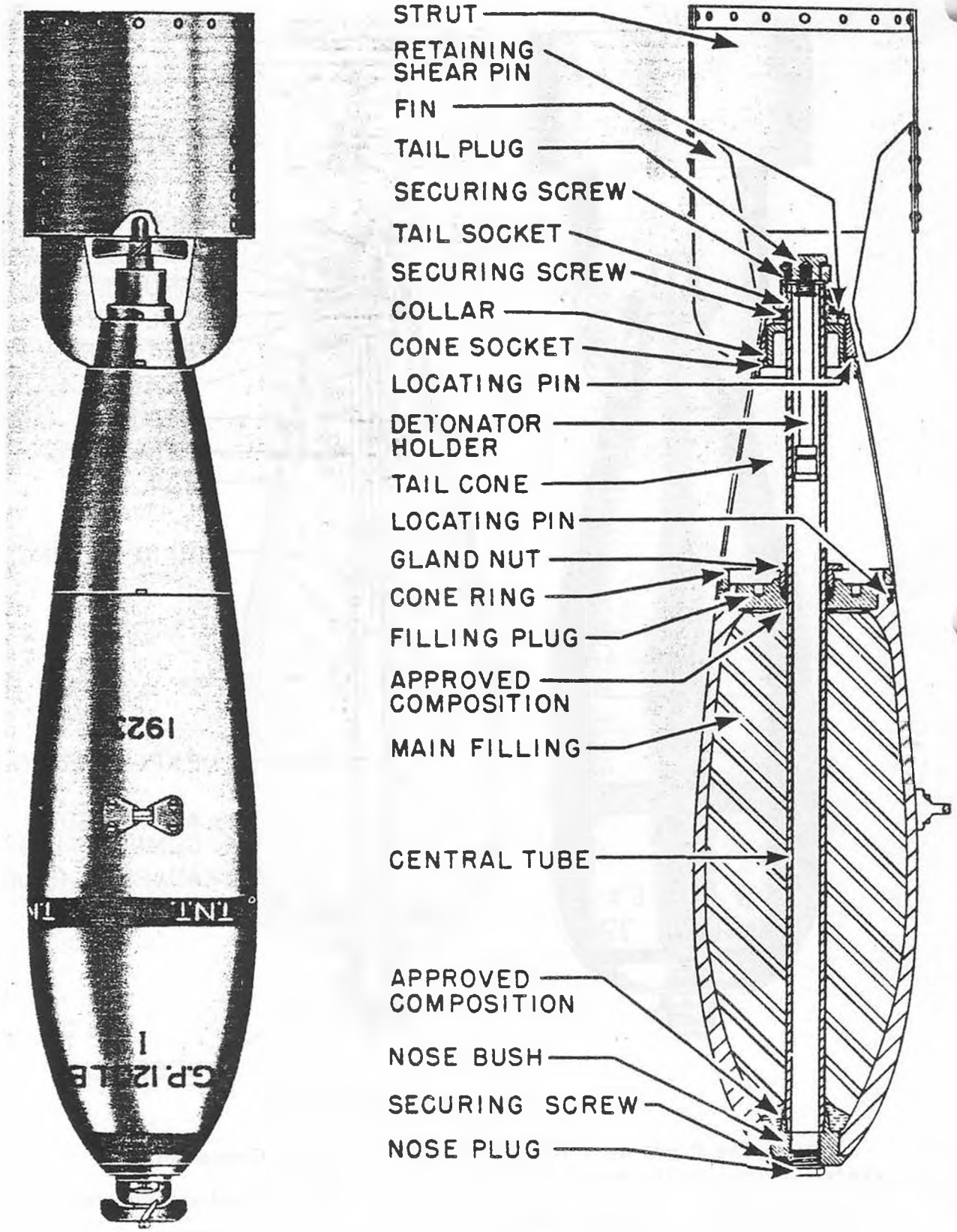


Figure 69—G.P. 120-lb. Bomb Mk I

G.P. 120-lb. Mks I and II (Obsolete)

Data

Fuzing ..... Nose Pistol No. 19; Tail Pistol No. 21
Color markings.....Yellow over-all; ½-in. red band around nose and 1-in. light green band around body. Longitudinal green bar on body and tail indicates explodering scheme.
Over-all length .....42.4 in.
Body length .....21.5 in.
Body diameter .....8.1 in.
Wall thickness .....0.5 in.
Tail length .....15.7 in.
Tail width .....8 in.
Total weight.....120 lb. (Amatol 80/20)
Charge/weight ratio 25%

Body Construction: The body is a streamlined steel casting or forging, threaded at the nose to take the nose adapter, which holds the central exploder tube. At the other end of the casting is a threaded base plug through which the exploder tube passes. Welded to the end of the casting is a streamlined section of thin metal, containing no explosive, which is tapered to take the tail ring. The exploder passes through this section also.

Tail Construction: A truncated cone fits over the rear section of body and is held to it by a locknut over the exploder tube. Three mild-steel fins are fastened to the cone, and are reinforced by a cylindrical strut.

Suspension: The bomb uses a single suspension lug secured to the body by four screws.

Explosive Components

Detonators—Instantaneous
Exploders—TNT and C.E. pellets
Filling—32.5 lb. TNT, or 30 lb. Amatol 80/20

G.P. 500-lb. Mks I, II and III (Obsolete)

Data

Fuzing.....Nose Pistol No. 19; Tail Pistol No. 17 or 22
Color markings.....Yellow over-all; ½-in. red band around nose and 1-in. light green band around body. Light green bar on body and tail indicates explodering scheme.
Tail No.....No. 1 Mk I (Mk III bomb only)
Over-all length .....68.7 in.
Body length .....35.7 in.
Body diameter .....13 in.
Wall thickness .....⅞ in.
Tail width .....13 in.
Total weight .....509 lb. TNT filled
Charge/weight ratio 28%

Body Construction: The body is a streamlined steel casting or forging threaded at the nose to take the nose adapter, which holds the central exploder tube. At the opposite end is a threaded base plug through which the exploder tube passes. Welded to the after end of the body is a streamlined cone of thin metal, containing no explosive, which is tapered to take the tail ring. The exploder also passes through this section.

Tail Construction: The tail has a truncated cone, which fits over the rear section of the body and is held to it by a locknut over the exploder tube. Four mild-steel fins are fastened to the cone, and are reinforced by a cylindrical strut.

Suspension: The bomb is suspended by a single suspension lug secured to the body by four screws.

Explosive Components

Detonators—Instantaneous
Exploders—TNT and C.E. pellets
Filling—143 lb. of TNT, or 134 lb. of Amatol 80/20

Remarks: The tail fins are usually painted red when time pistols are used.

H.C. 2,000-lb. Mk I (Obsolete)

Data

Fuzing.....Nose Pistol No. 27, 42, or 44
Color markings.....Dark green over-all; ½-in. red band, three ½ in. from front edge of cylindrical shell, and 2-in. light green band 16 in. from edge
Tail No.....No. 32 Mk I, or No. 10 Mk I or II, or Parachute attachment
Over-all length .....162 in.
Body length .....99.5 in.
Body diameter .....18.5 in.
Wall thickness .....0.19 in.
Tail length .....60 in.
Tail width .....18.6 in.

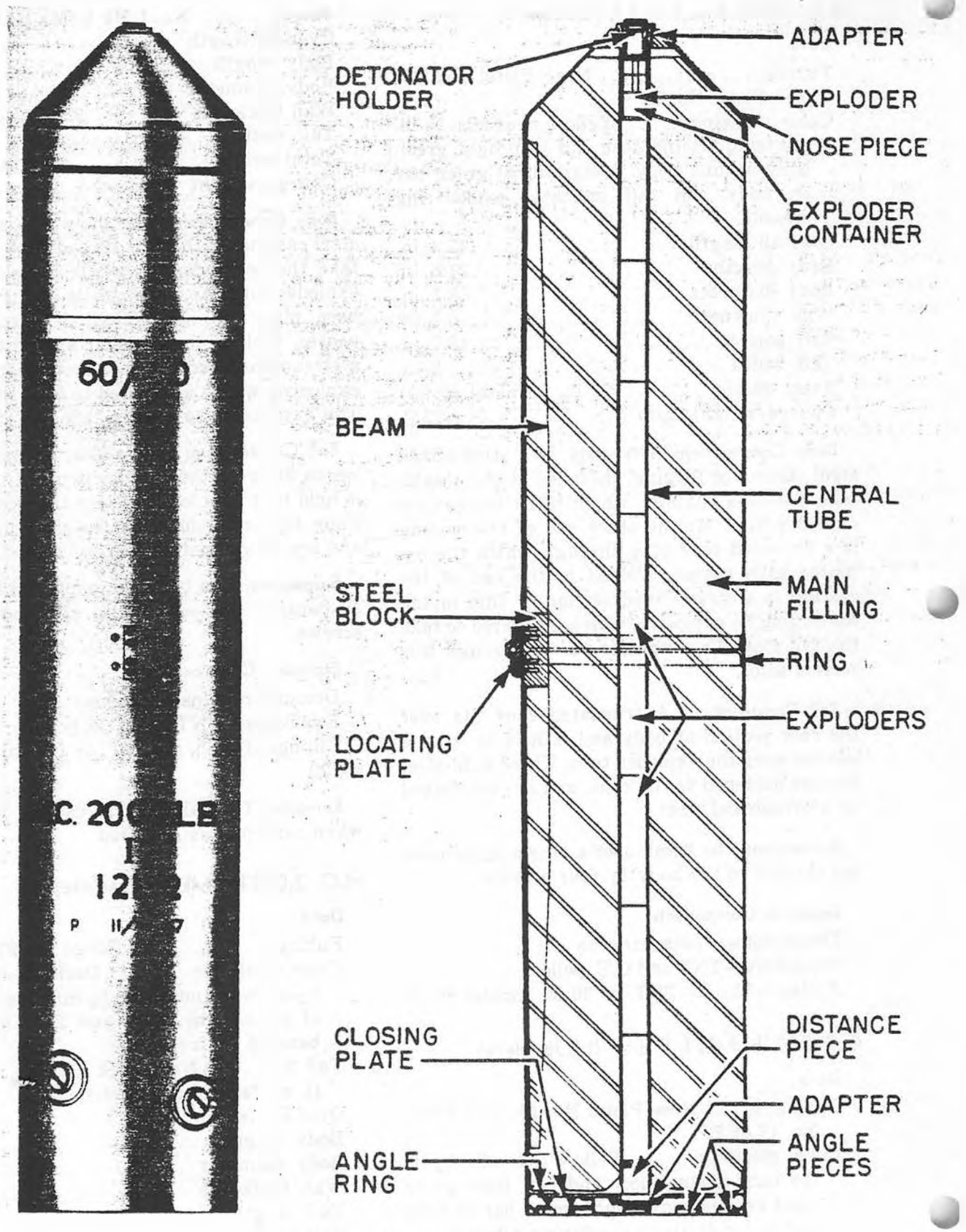


Figure 70—H.C. 2,000-lb. Bomb Mk I

Total weight .....1,842 lb.
Charge/weight ratio 73%

Body Construction: The body consists of a cylindrical steel shell with a hollow, conical nose piece welded to one end, parallel sides, and a closing plate bolted to an angle ring which is welded in position a short distance within the other end. A radial strengthening band is welded internally at the center of gravity, and its ends are welded to a steel block. Holes tapped through the shell and steel block receive the suspension-lug screws. Side pockets for supplementary fuzing are present near the base end, but are not used. The shell is strengthened longitudinally by two channel beams welded to each end of a central steel block and to the shell interior.

Tail Construction: The Tail No. 32 Mk I assembly consists of a cylinder of light-gauge metal with a metal tray secured in its forward end and a strengthening ring in its open rear end. The tray has a series of equispaced bayonet dogs for attaching to the body bayonet joints welded to it. The cylinder has a number of openings to give it stability.

The parachute attachment has a parachute 5 ft. 6 in. in diameter, attached to a metal tray having bayonet dogs for attaching it to the body. The parachute is retained by waterproofed fabric and a retaining pin. The retaining pin is attached to a static cord stitched on the outside of the last protective panel, and connected to the bomb carrier or aircraft. On release the cord pulls the retaining pin and chute free, and breaks off from the plane when the chute is extended.

Suspension: The bomb is suspended by a single suspension lug bolted to the body and an internal steel block at the center of gravity. The screw holes are closed by transit screws until the bomb is to be used, at which time the lug is attached.

Explosive Components

Detonators—(See Part 2, chap. 4, Detonators.)

Exploders—A central exploder tube extends from the nose exploder container. The tube contains eight 33¼ oz. TNT exploders. The exploder container contains a 9 oz. TNT exploder.

Filling—1,340 lb. Amatol 60/40 sealed at each end with an approved composition.

Remarks: This bomb may be fitted with a nose attachment of light-gauge metal to retard the bomb in flight. It consists of a cylinder fitting over the forward end of the body shell and projecting forward beyond it around the conical nose piece. Two side fuzing pockets are usually not used, but might contain the Time Pistol No. 47.

A.S. 35-lb. Mks I and II (Obsolete)

Data

Fuzing .....Nose Fuze No. 866
Color markings.....Dark green over-all; ½-in. red band and 1-in. light green band around body
Over-all length .....29.2 in.
Body length .....17.2 in.
Body diameter .....7 in.
Wall thickness .....0.064 in.
Tail length .....17 in. (approx.)
Tail width .....7 in.
Total weight .....35 lb.
Charge/weight ratio 46%

Body Construction: The bomb has parallel sides, with a nose adapter and a tapered rear section. A tail adapter secures the tail to the body. The explosive charge is cone shaped, employing the principle of the Munroe shaped charge. A cylindrical nose attachment is welded onto the nose adapter by four tack welds. The exploder is in the rear of the body, and is initiated by a flash from the nose fuze, communicated through the supporting tube extending from the nose cavity to the exploder.

Tail Construction: The tail consists of a long hollow tube with a cylindrical strut attached to it by six fins. The tail threads into the tail adapter, and is secured by a locking screw. The six fins are formed by three sets of W-shaped supports welded to the tail tube.

Suspension: The Bomb Mk I has a single lug for suspension in aircraft. The Mk II has no lug, as it is intended to be fired from shipboard.

Explosive Components

Exploder—C.E. pellets

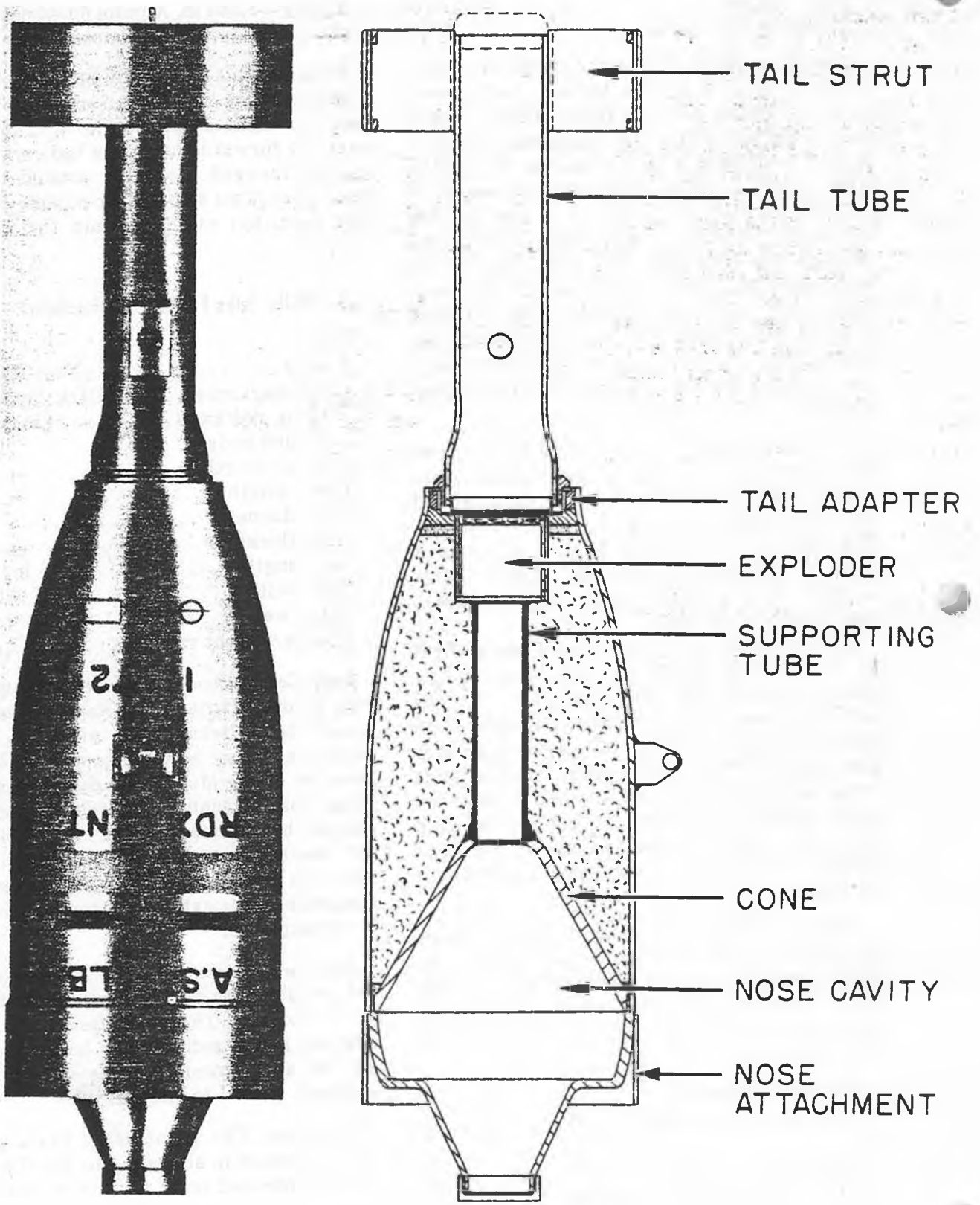


Figure 71—A.S. 35-lb. Bomb Mk I

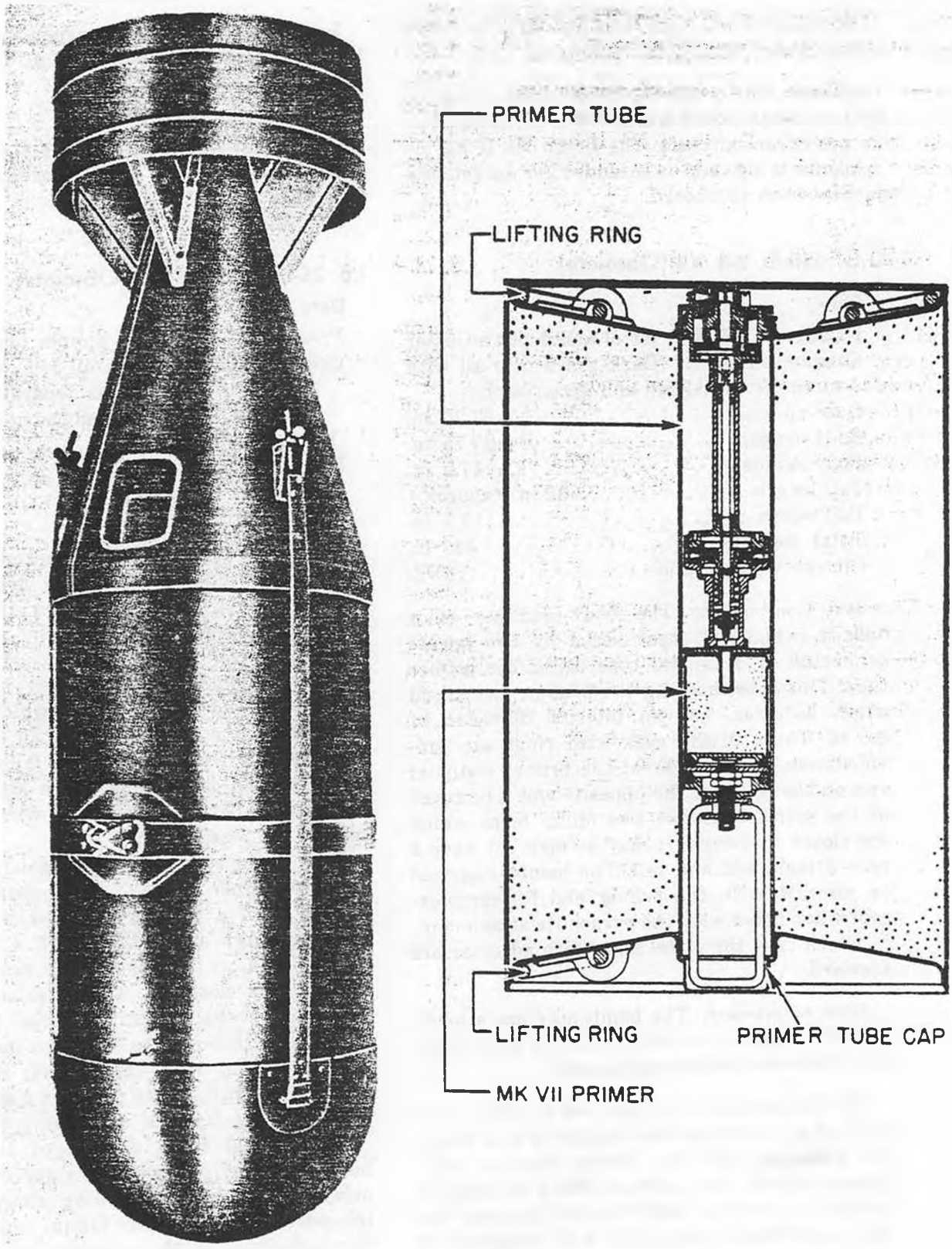


Figure 72—D.C. 450-lb. Bomb Mk VII

Filling—16 lb. RDX/TNT 60/40. The after end is sealed by a ¼-in. topping of TNT.

Remarks: The Bomb Mk I was designed for use by the coastal command and was intended to be dropped from aircraft. The Bomb Mk II has no suspension lug, and is intended for spigot projection from shipboard.

D.C. 450-lb. Mk VII (Obsolete)

Data

Fuzing....Mk X** pistol and depth adjuster
Color markings....Dark green over-all with circumferential red and green bands
Over-all length .....67.25 in.
Body length .....27.75 in.
Body diameter .....17.5 in.
Tail length.....32 in. (approx.)
Tail width .....17.5 in.
Total weight .....450 lb.
Charge/weight ratio 64%

Body Construction: The body consists of a welded cylindrical case, closed by two covers connected by a central tube called the primer tube. This tube, housing the primer, pistol, and depth adjuster, has an internal diameter of 3.5 in. Three lifting eyes with rings are provided, one on the cover at the primer end, and two on the cover at the opposite end. The cover at the primer end has two filling holes which are closed by bungs. It may or may not have a nose attachment and tail. The bomb is carried on aircraft with the primer end forward, except when fitted with the parachute attachment, in which case the pistol and depth adjuster are forward.

Nose Attachment: The bomb may use a hemispherical hollow nose held on by the side straps, which also secure the tail assembly.

Tail Construction: The tail, when fitted, consists of a cylindrical strut attached to a hollow tail cone by four fins. Three brackets, equispaced around the cone, are fitted to take the ends of the straps which secure the nose and tail attachments, both of which break off on impact with water. The bomb may have a parachute attachment on the primer end if dropped from high-speed aircraft.

Suspension: The bomb is suspended by a single lug on a suspension band around the center of gravity.

Explosive Components

Detonator—Mk VII, A.S.A. and C.E.
Primer—Mk VIII, 1 perforated and 1 solid C.E. pellet
Filling—290 lb. Amatol

I.B. 25-lb. Mks I and II (Obsolete)

Data

Fuzing.....Simple impact striker
Color markings.....Dull red over-all, with two ½-in. black bands separated by ½-in. red band painted around the nose
Over-all length .....32.6 in.
Body diameter .....5.03 in.
Tail length .....13.55 in.
Total weight .....25 lb.

Description: The Bomb Mk I consists of a cylindrical steel tube secured to a hollow, sharp-pointed nose by a nose adapter (built up externally to streamlined form by a cardboard fairing), a column of seven closed containers, termed fire-pots, accommodated in the body tube, a flanged base adapter which affords a mounting for a cap holder, a tail cone with a cylindrical tail vane secured to it by four vane supports, and a tail tube which accommodates a striker pellet, with a shear wire and creep spring, and a safety rod.

Each of the seven fire-pots consists of a cylindrical container made of magnesium alloy and formed with a central tube, which communicates, through a fire hole, with a recess in a central boss on the base of the container. The container is closed by a magnesium alloy lid, which has a shallow central recess in its outer side. Holes through the lid place this recess in communication with the interior of the container. The ignition cap contains a layer of gunpowder and a layer of detonating composition.

The central tube of each of the fire-pots houses a delay charge and is surrounded by a delay charge and a priming charge for the thermite and magnesium filling, which occupies the remainder of the annular chamber in the fire-pot. A loop of quickmatch extends into the bore of the central tube and has its two ends carried out through the slots in the tube and

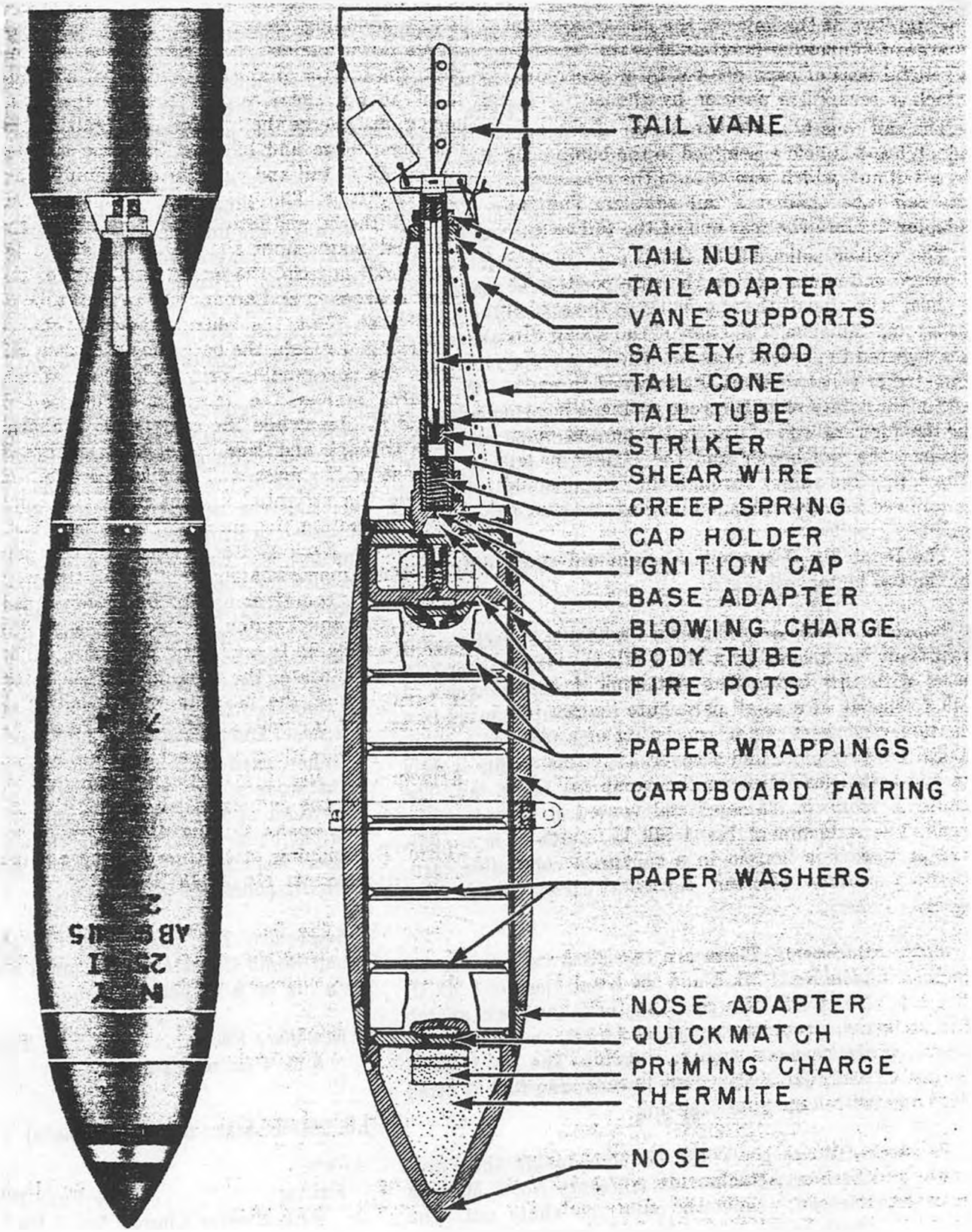


Figure 73—I.B. 25-lb. Mk I

through two of the holes in the lid. An ejection charge of gunpowder is retained in the recess in a central boss of each fire-pot by a paper disc, which is secured in position by shellac.

The tail cone fits over the flange of the base adapter and is held assembled to the bomb body by a tail nut, which screws onto the rear end of the tail tube against a tail adapter. The tail adapter fits into the rear end of the tail cone.

The striker pellet has a sharp point at the forward end and is held in the safe position by a shear wire passed through holes in the striker pellet and tail tube. The ends of the shear wire are soldered to prevent removal. The rear end of the striker pellet receives the forward threaded end of the safety rod. The creep spring is housed in the forward end of the tail tube and bears against the cap holder and the striker pellet. The safety rod passes through the tail tube and is screwed into the threaded bore of the striker pellet.

The Bomb Mk II has only a slight difference in the tail plate.

Parachute Attachment: Either a Parachute Attachment No. 1 Mk I or a No. 1 Mk II may be used with this bomb. The Attachment No. 1 Mk I consists of a small parachute housed in a container of sheet metal, consisting of a cylindrical housing plate and a cover. It fits loosely in the cylindrical strut of the bomb tail. The chute is 15 in. in diameter and vented at the peak. The Attachment No. 1 Mk II is similar, except that it is housed in a collapsible cardboard container between cardboard packing discs.

Striker Attachment: There are two striker attachments, the No. 1 Mk I, and the No. 1 Mk II. No. 1 Mk I consists of a coupling fork, snatch rod, striker rod, coupling socket, and a retaining sleeve, which houses a spring. The No. 1 Mk II is similar, except that the coupling fork is fitted with a quick-release pin.

Functioning: When the bomb using the Parachute and Striker Attachments No. 1 Mk I is released, the cover pulls the chute out. The chute opens and pulls the snatch rod against the action of the spring until the striker rod retaining balls escape into the annular recess in the retaining sleeve. The striker rod then moves down against the striker pellet. On impact, the inertia of the rod and pellet combine to shear the shear wire, overcome the creep spring, and pierce the ignition cap, igniting the blowing charge and blowing the base adapter and complete tail and parachute assembly from the body tube. The quickmatch, which passes through the lid and into the central tube of the rearmost magnesium alloy fire-pot, is also ignited, and, in turn, the quickmatch ignites the delay charges in and around the central tube of the fire-pot. While the central tube delay charge is burning through, the outer delay charge initiates the surrounding priming charge, which, in turn, ignites the incendiary composition around it. Meanwhile the central delay charge burns through and fires the ejection charge in the base of the fire-pot. This has the effect of ejecting the activated fire-pot from the bomb and also igniting the quickmatch of the second fire-pot, etc. Each ejected fire-pot will continue to burn for approximately 10 minutes; the magnesium alloy container and lid being consum[illegible] Finally, the quickmatch in the lid closing the nose of the bomb is ignited by the last ejection charge and initiates the priming charge, which, in turn, ignites the incendiary composition of the nose, and provides an additional fire source.

When used with the Parachute and Striker Attachments No. 1 Mk II, the parachute is blown out of the cylindrical shroud on the tail and the chute opens, freeing the striker mechanism. Functioning after this is same as that with Attachments No. 1 Mk I.

Suspension: The bombs may be carried in a Small Bomb Container, or from a bomb carrier by a lug on a suspension band.

Incendiary Filling: .....1 lb. Thermite, and 5 lb. 4 oz. magnesium

I.B. 250-lb. Mks I and II (Obsolete)

Data

Fuzing.....Nose Fuze No. 36 Mk II with Ejector Charge No. 2 Mk I

Color markings.....Red over-all; two 2-[illegible] black bands separated by a 2-in. bright red band near the nose

Tail No. .....No. 1, Mk I
Over-all length.....61 in. (approx.) without fuze
Body length .....34.1 in.
Body diameter .....12 in.
Tail length .....27.2 in.
Tail width .....11.7 in.
Fuel weight .....68 lb.
Total weight .....193 lb.

Description: The bomb has a cylindrical body with a hemispherical nose and parallel sides. An ejector-charge container is screwed and cemented into the nose and takes the nose fuze. The tail consists of a tail cone and a cylindrical strut attached to the cone by four fins. The after end of the body is closed by a tail plate, which is lightly secured to the body.

Functioning: On impact, the fuze functions and ignites the gunpowder ejection charge, which in turn ignites the incendiary filling and ejects it with the tail and tail plate.

Suspension: The bomb is suspended by a single suspension lug.

Filling: The Bomb Mk I is filled with a phosphorus-rubber-benzene mixture. The Bomb Mk II is filled with a "sticky inflammable liquid." The ejector charge consists of black powder.

Remarks: This bomb was intended primarily for attacking forested areas, and can be dropped from heights up to 3,000 feet.

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OBSOLETE BOMBS

Data	G.P. 50-lb. Mk I	R.L. 250-lb. Mk II	R.F.C. 230-lb. Mks I, II, III	R.A.F. 500-lb. Mk I	R.L. 520-lb. Mk I	R.A.F. 550-lb. Mk I	R.L. 550-lb. Mk I	S.N. 1400-lb.
Fuzing: Nose	Pistol No. 19	Pistol No. 19 Pistol No. 20	None	Pistol No. 8 Pistol No. 19	Pistol No. 9 Pistol No. 20	Pistol No. 8 Pistol No. 19	Pistol No. 9 Pistol No. 20	Pistol No. 13
Tail	Pistol No. 21	Pistol No. 5B	Pistol No. 5B	Pistol No. 5B	Pistol No. 5B	Pistol No. 5B	Pistol No. 5B	Pistol No. 12
Over-all Length	30.7 in.	35.0 in.	50.7 in.	61.6 in.	60.7 in.	61.1 in.	60.8 in.	133.1 in.
Body Length	15.0 in.	30.5 in.	46.0 in.	55.0 in.	54.0 in.	46.5 in.	42.0 in.	93.0 in.
Body Diameter	5.9 in.	12.5 in.	10.0 in.	19.0 in.	19.6 in.	15.0 in.	15.0 in.	18.5 in.
Wall Thickness	0.38 in.	....	0.22 in.	0.15 in.	0.25 in.	0.9 in.	0.9 in.	0.51 in.
Tail Length	15.7 in.	19.0 in.	18.0 in.	19.0 in.	18.5 in.	21.0 in.	24.0 in.	49.0 in.
Tail Width	5.9 in.	18.0 in.	19.5 in.	19.0 in.	19.6 in.	15.0 in.	15.0 in.	20.0 in.
Type Filling	a. TNT b. Amatol	TNT	a. TNT b. Amatol	a. TNT b. Amatol	a. TNT b. Amatol	a. TNT b. Amatol	....	Amatol
Filling Weight	a. 9.3 lb. b. 11.8 lb.	86.0 lb.	a. 140 lb. b. 110 lb.	a. 356 lb. b. 280 lb.	a. 354 lb. b. 273 lb.	a. 200 lb. b. 157 lb	....	709 lb.
Total Weight	a. 45.3 lb. b. 47.8 lb.	255 lb.	a. 240 lb. b. 210 lb.	a. 536 lb. b. 460 lb.	a. 534 lb. b. 453 lb.	a. 566 lb. b. 523 lb.	....	1433 lb.
Charge/Weight Ratio	a. 20.4% b. 24.3%	33.8%	a. 58.5% b. 52.5%	a. 66.5% b. 61.0%	a. 66.5% b. 60.0%	a. 35.4% b. 30.0%	....	49.5%

These bombs are all general purpose type bombs, which are now obsolete. All had a central burster tube running the entire length of the bomb.

Part I—Chapter 18

TARGET IDENTIFICATION BOMBS

Introduction

Target identification bombs are designed to illuminate or mark a target for night bombing, but can also be used for emergency landings. Not all T.I. bombs are filled with flare candles. Some of them, such as the photoflash and sea marker T.I. bombs, contain special fillings. But, because the majority of these bombs do contain candles, the following explanation is given in order to simplify the discussion of the bombs.

Three general types of candles are employed. They are the non-delay, delay, and explosive candle. The non-delay candle may give illumination of various colors, and, as the name indicates, the candle commences to function immediately on initiation. This type of candle gives a sky marking effect due to the illumination given off during its fall.

The delay candle may also give illumination of various colors, but only after a period of delay, the length of which is determined by the delay unit contained in the candle.

The explosive candle is used in ground marker bombs, which contain a percentage of these candles to discourage interference with marker candles. They contain an illuminant which burns until it ignites the explosive charge. This explosive charge is also a component of the candle.

The specific types of candles are listed as follows:

Type A—These are non-delay candles of three minutes duration giving red, green, or yellow illumination.

Type B1—These are delay candles which burn for a period of approximately two minutes with a red, green, or yellow light after a delay of two and one half or five minutes.

Type B2—These are delay candles which burn with a red, green, or yellow light. The delay and period of illumination depend upon the relative amounts of the two compositions.

Type B3—These are long-delay candles which employ safety fuse to give a delay of from thirteen to thirty minutes. The candles burn with a red, green, or yellow light for approximately three minutes.

Type C—These candles burn with a red, green, or yellow light when initiated. A delay composition separating the two illuminant sections provides a delay of two and one half to eleven minutes between sections. This flare has two burning periods.

Type D—These are explosive candles which burn with a red, green, or yellow light until the explosive charge is ignited.

Type E—These are explosive candles whose illuminant is ignited by safety fuse after a delay of from fifteen to thirty-one minutes. The illuminant burns with a red, green, or yellow light for approximately two minutes, after which it ignites the explosive charge.

Type F—This is an explosive candle with two illuminant sections separated by delay composition. The delay is from two and one half to nine minutes, depending on the amount of flare composition, which burns red, green, or yellow. The second illuminant section ignites the explosive charge.

Type G—These are non-delay candles equipped with parachutes to give a skymarker effect. They provide red, green, or yellow illumination for approximately three minutes.

Type H—This is a non-delay candle, which contains alternate colored flare pellets of red and yellow, red and green, or yellow and green. Each pellet burns for approximatey fifteen seconds, giving a total burning time of approximately five and one half minutes.

Type J—This is another non-delay candle containing alternate colored pellets, as well as

an explosive charge. The flare burns for approximately two, three, or four minutes before exploding, depending on the number of pellets it contains.

Type K—These non-delay candles are similar to and burn with the characteristic white illumination of the 4-lb. incendiary bomb, but have a different ignition system.

Type L—These are white, non-delay candles similar to the Type K, but having a steel nose containing a high explosive charge, which explodes after a delay period subsequent to the illuminant's burning out.

Type M—These are non-delay, change-color candles similar to the Type H but having a three-minute over-all burning time. The color changes are red and yellow, yellow and green, or red and green.

Type N—These are non-delay, change-color, explosive candles similar to the Type J, but having a period of illumination of two minutes and color combinations of red and yellow, yellow and green, or red and green.

Type P—This is a delay candle which burns red, yellow, or green before exploding. The illuminating time depends on the relative quantity of delay composition and illuminant.

Type Q—This is a delay candle which gives a succession of white flashes of long and short duration arranged in sequence as a Morse code signal. A delay of three quarters of a minute to twenty-three minutes is provided by safety fuse.

Type R—This is a non-delay candle, which gives a succession of white flashes of long and short duration arranged as a Morse code signal.

Red Flash Unit—This flash unit gives a red flash of short duration after a predetermined delay period.

T.I. bombs are painted black over-all with a colored band around the nose plug to indicate flare color, and a ½-in. red filling band 8 in. from the nose. The color of the flares is also stencilled on the bomb body. A red cross near the base of the bomb indicates that explosive candles are used.

The corresponding marks of the 250-lb. bombs No. 1-6, 9, 10, 15, 16, 17, and 23-28 are identical in construction and operation, differing only in the fillings. Consequently these bombs are grouped for purposes of description.

The 1,000-lb. T.I. bombs are larger versions of the 250-lb. size and correspond according to the "Number" in the designation. Thus the T.I. 1,000-lb. No. B.22 would be the enlarged equivalent of the T.I. 250-lb. No. 22 bomb.

T.I. 250-lb.

[No. 1 Mks I, IC, II, and III; No. 2 Mks I, II, and III; No. 3 Mks I, IC, II, and III; No. 4 Mks I, IC, II, and III; No. 5 Mk I; No. 6 Mk I; No. 9 Mk I; No. 10 Mk I; No. 15 Mk I; No. 16 Mks I, IC, II, and III; No. 17 Mks I and III; No. 23 Mks IC, and III; No. 24 Mks IC and III; No. 25 Mks IC and III; No. 26 Mk III; No. 27 Mk III; and No. 28 Mk III (Service)]

Data

Fuzing .....Nose Fuzes No. 860 Mk II, No. 848, or No. 896 Mk I; Tail Fuze No. 867 Mk I

Color markings.....The bomb body is painted black over-all with a colored band around the nose to indicate the flare color, and a ½-in. red band 8 in. from the nose. The color of the flare is also stencilled on the bomb body. A red cross near the rear of the bomb indicates that explosive candles are used.

Tail No.....Bombs Mks I and II—No. 1 Mk II, No. 35 Mk I, or No. 75 Mk II; Bombs Mk IC and Mk III—No. 75 Mks I or II

Over-all length .....61.7 in.
Body diameter .....12 in.
Tail length .....27.2 in.
Tail width .....11.7 in.
Total weight .....220 lb. (approx.)

Body Construction: The corresponding marks of the numbered bombs listed in this section are identical in construction and operation. They differ only in the types of candles they contain. Bombs Mk I and Mk II are nose-fuzed only, while Mks IC and III have provisions for both nose and tail fuzing.

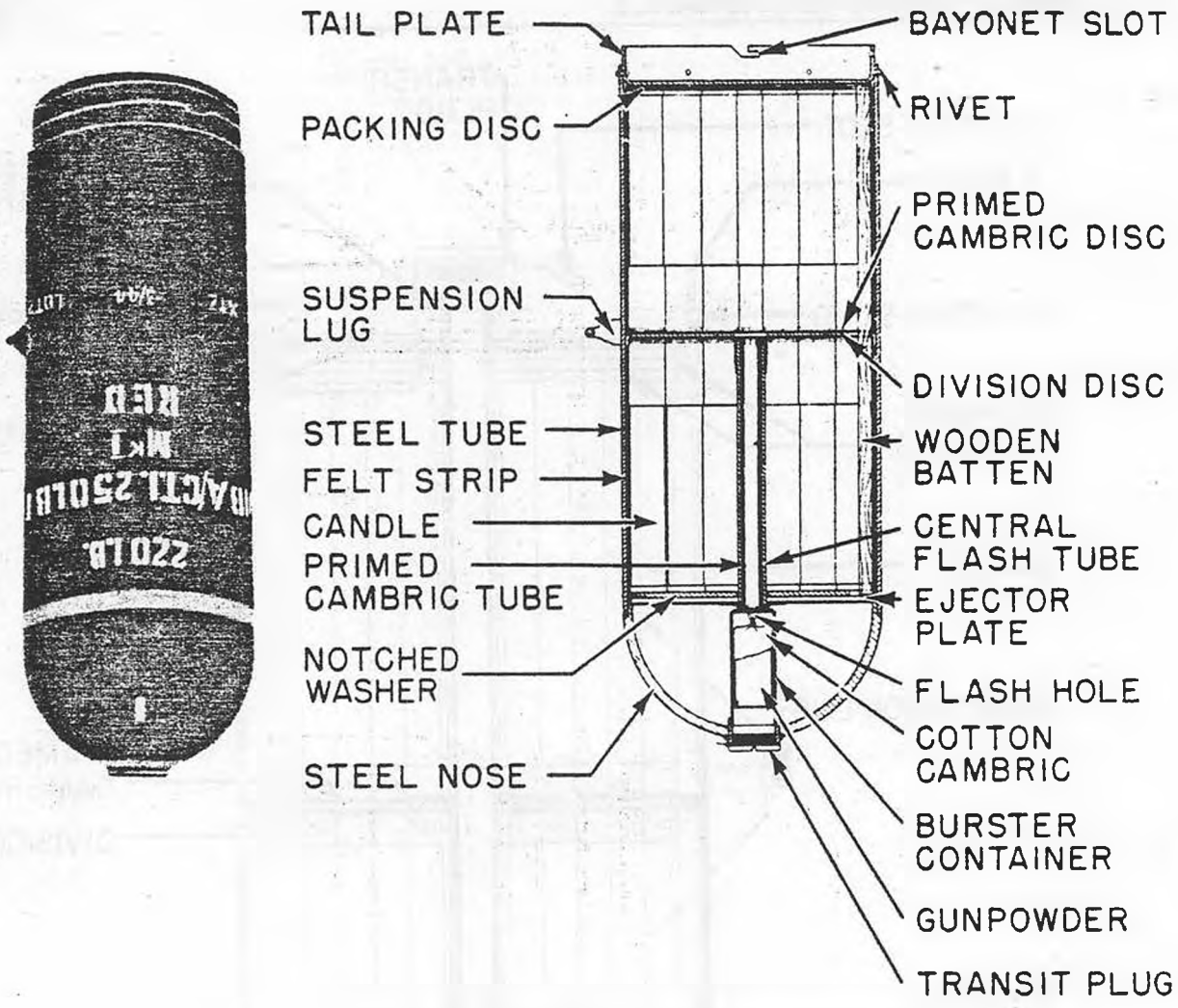


Figure 74—T.I. 250-lb. Bomb No. 1 Mk I

Mk I Body—The Mk I bomb body consists of a heavy-gauge steel tube, to one end of which is welded a steel nose. The after end of the body is closed by a tail plate held in place by six brass rivets. The tail plate has two bayonet slots and a hole to be engaged by a transit base or the tail unit.

In the nose of the bomb is located the burster container, which houses a 3-ounce black-powder ejection charge in a cambric bag or celluloid container.

Immediately abaft the burster container is the ejection plate, slightly smaller than the internal diameter of the bomb body, to which the central flash tube is welded. The division disc, which separates the two layers of candles, is located at the opposite end of the flash tube. The inside of the tube and both sides of the division disc are covered with primed cambric. The igniter ends of both layers of candles rest against one of the primed discs.

The candles are held in position in the bomb body by felt or corrugated paper strips lining the inside of the body, a number of notched packing discs located beneath the tail plate, and a notched washer located against the ejection plate. Three equispaced wooden battens, which pass through notches in the division plate, extend between the ejector plate and tail plate in order to force off the tail plate when the bomb functions.

Mk II Body—The Mk II bomb body is identical to the Mk I except for the use of a different type suspension lug, and a light-gauge steel body which necessitates the use of a cast-iron weight welded inside the nose.

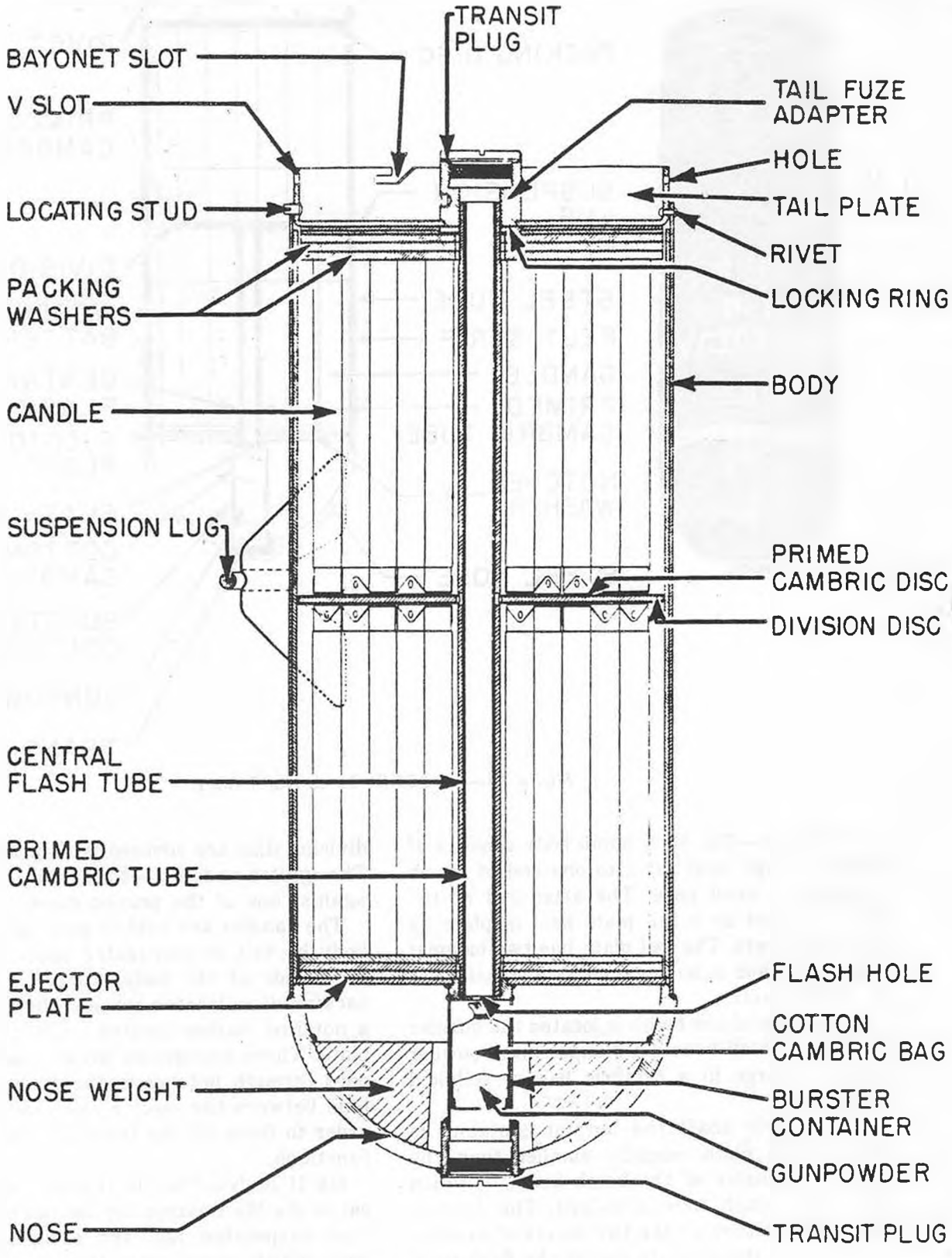


Figure 75—T.I. 250-lb. Bomb No. 1 Mk III

Mk III Body—The body of the Bomb Mk III consists of a light-gauge steel tube which has a steel nose welded to one end. A cast-iron weight is welded inside the nose section. The after end of the body is closed by a tail plate held in position by three locating studs, which engage three slots in the after end of the body, and is secured in position by three brass rivets.

The tail plate has two bayonet slots and a hole to be engaged by pins on a transit base, or the securing screws of the Tail Unit No. 75 Mk I or Mk II. A V-slot in the skirt of the tail plate, aligned with one of the locating studs and diametrically opposite the hole, receives the locating pin on the Tail No. 75 to assure that the tail slot for the tail fuze lanyard is aligned with the suspension lug of the bomb. The suspension lug is of the same type used on the Mk II body.

The burster container is similar to that of the Bomb Mk I, but is welded to the ejector plate and internally threaded to receive the forward end of the central flash tube. The after end of this tube threads into the tail-fuze adapter, which is locked in place, and the whole assembly is secured to the tail plate by a locking ring.

The two layers of candles are separated by a division disc, and a priming system, similar to the one used in the Bomb Mk I, is used to ignite them. The candles are positioned as in the Bomb Mk I, but the wooden battens are not used, as the central flash tube serves to force off the tail plate when the bomb functions.

Mk IC Body—This bomb is very similar to the Mk III, but as it employs a Mk I body converted for tail fuzing, its body is of thick-gauge steel, and consequently the nose weight is dispensed with. The central tube is welded to the inner end of the burster container and is also welded to the ejector plate.

Functioning

Mks I and II—When the bomb is dropped, the fuze is set in operation and the bomb falls freely until the fuze explodes, igniting the burster charge of the bomb. The flash from the burster charge passes through the flash hole in the burster container, and is conveyed to the primed cambric discs on the division disc by the primed cambric in the central flash tube. These division discs ignite the candles.

Simultaneously, the gases from the burster charge expand and force the ejector plate toward the tail of the bomb. The wooden battens force the tail plate and tail off the bomb, and the ignited candles are ejected and function in the normal manner.

Mks III and IC—If the bomb is tail-fuzed only, the functioning of the fuze produces a flash which ignites the primed cambric in the central flash tube. This primed cambric conveys the flash to the burster charge, which it ignites, and also passes through holes in the central tube to ignite the primed cambric discs on either side of the division disc. These in turn ignite the candles.

Simultaneously the explosion of the burster charge shatters the burster container at a weakened point, and the gases formed force the ejector plate toward the tail of the bomb. The central tube forces off the tail plate and tail unit, and the candles are ejected to function in the normal manner.

If the bomb is nose-fuzed only, it will function in a similar manner except that the burster charge is ignited directly by the flash from the fuze magazine and the primed cambric tube is ignited by the burster charge.

Tail Construction

The Tail Units No. 1 Mk II, and No. 35 Mk I consist of a tail cone to which a cylindrical strut is attached by four fins. Three screws secure the tail to the tail plate of the bomb.

The Tail Assembly No. 75 Mk I consists of a tail cone to which a cylindrical strut is attached by four fins. Three screws attach the cone to the tail plate of the bomb, and a locating pin engages a V-slot in the tail plate to position the tail. An arming assembly, consisting of an arming spindle, arming vanes, and an arming-spindle fork, is also present. The Tail Mk II has cut-away fins to allow the arming vanes to be recessed for protection. Both the Tails Mk I and Mk II have inspection windows in the tail cone.

Suspension: The bomb is suspended by a single lug, which is welded to the body.

Filling

No. 1 Mk I—60 Type A, or 62 Type K candles
No. 1 Mks IC and III—60 Type K candles

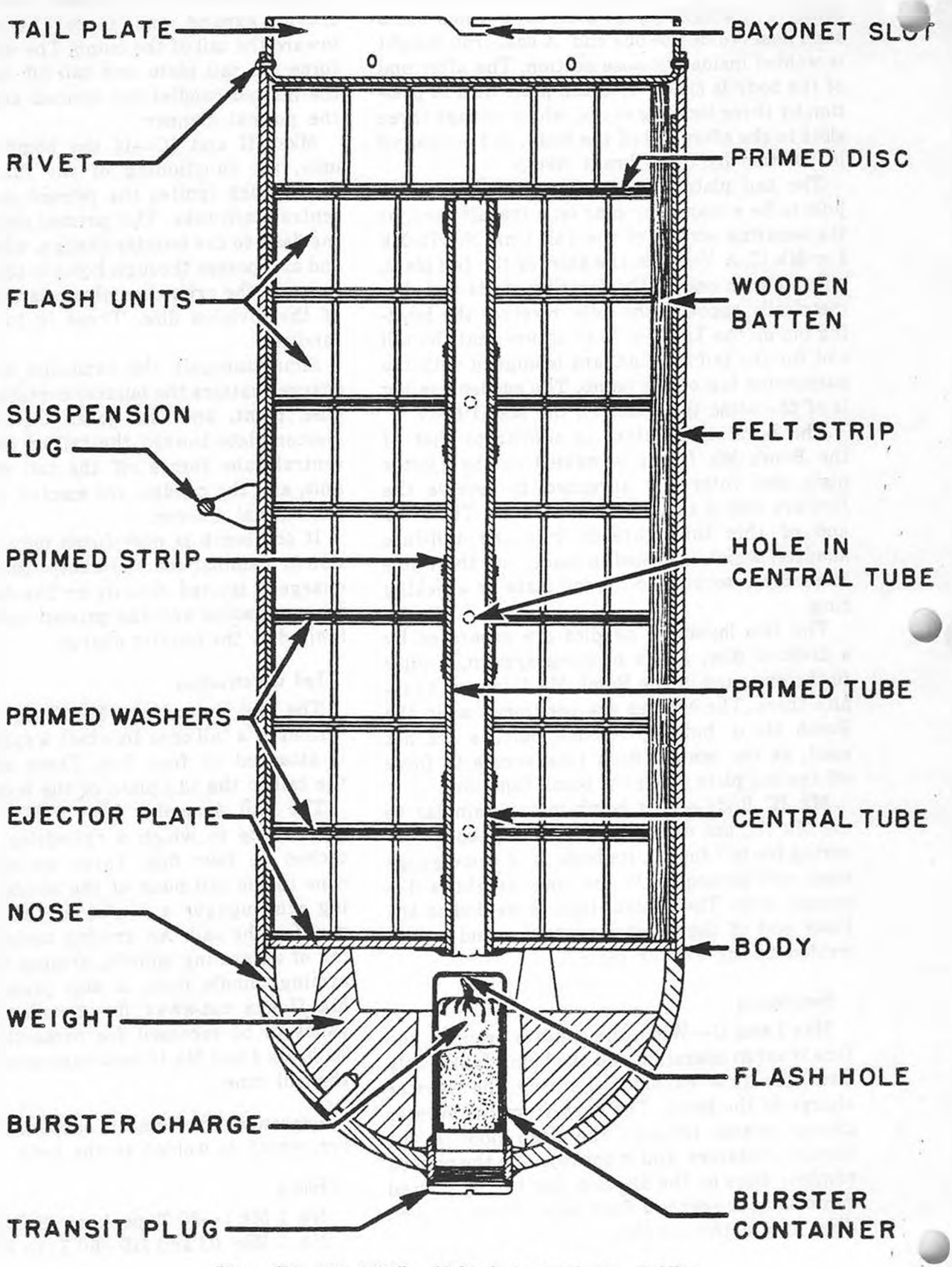


Figure 76—T.I. 250-lb., Multi-Flash, Bomb No. 7 Mk I

No. 1 Mk II—60 Type A candles
No. 2 Mk I—56 Type A and 4 Type D candles, or 56 Type K and 4 Type L candles
No. 2 Mks II and III—56 Type A and 4 Type D candles
No. 3 Mks I, IC, II, and III—20 Type A and 40 Type B1 candles
No. 4 Mks I, IC, II, and III—16 Type A, 40 Type B1, and 4 Type D candles
No. 5 Mk I—30 Type A and 30 Type B1 candles
No. 6 Mk I—26 Type A, 30 Type B1, and 4 Type D candles
No. 9 Mk I—60 Type C candles
No. 10—Mk I—60 Type B1 candles
No. 15 Mk I—30 Type A and 30 Type D candles
No. 16 Mks I, IC, II, and III—9 Type A, 46 Type B2, and 4 Type F candles
No. 17 Mks I and III—60 Type M candles
No. 23 Mks IC and III—9 Type A and 39 Type B2 candles
No. 24 Mks IC and III—11 Type A, 45 Type C, 1 Type D, and 3 Type F candles
No. 25 Mks IC and III—23 Type B2, 19 Type B3, 1 Type D, 1 Type E, and 2 Type F candles
No. 26 Mk III—11 Type A, 27 Type B2, 18 Type C, 1 Type D, 1 Type F, and 2 Type P candles
No. 27 Mk III—39 Type Q and 1 Type R candle
No. 28 Mk III—16 Type A, 40 Type C, and 4 Type D candles

T.I. 250-lb., Multi-Flash, No. 7 Mks I and II, and No. 21 Mks I, II, III, and IC (Service)

Data

Fuzing .....Nose Fuze No. 860 Mk II, No. 848, or No. 896 Mk I
Color markings .....The bomb is painted black over-all with a ½-in. red filling band located 8 in. from the nose. MULTI-FLASH RED is stenciled in red letters on the nose, and in white letters on the body.
Tail No. .....No. 1 Mk II, No. 35 Mk I, or No. 75 Mk II
Over-all length .....67.75 in.
Body diameter .....12 in.
Tail length .....27.2 in.
Tail width .....11.7 in.
Total weight.....220 lb. (approx.)
Burning time .....0.1 sec. (individual unit)
5 min. (total contents of bomb)

Body Construction

No. 7 Mks I and II and No. 21 Mks I and II Bodies—The actual construction of these bombs is the same as that of the No. 1 T.I. Bomb Mk I except for a different arrangement of the filling, which requires a different type of central flash tube and priming, and eliminates the use of the division disc.

The flash units are packed around the central tube in seven layers, each of which contains 26 units; and an eighth layer, containing 28 units, is positioned above the central tube. The flash units are positioned so that the primed ends of each two layers contact one of the four primed cambric washers for purposes of ignition. Each of these washers engages a strip of primed cambric, which is secured around a set of holes in the central tube.

The Bomb No. 7 Mk II differs from the No. 7 Mk I as the No. 1 Mk II differs from the No. 1 Mk I.

No. 21 Mk III and 1C Body—The body, tail-plate, burster container, and ejector plate of this bomb are the same as in the T.I. Bomb No. 1 Mk I. The interior arrangement of the Bomb No. 21 Mk III differs from the No. 7 and No. 21 Mks I and II in that the central flash tube extends completely through the bomb to the tail fuze pocket, thus displacing two of the flash units. The Bomb No. 21 Mk IC differs from the No. 21 Mk III as the No. 1 Mk IC differs from the No. 1 Mk III.

Functioning

No. 7 Mks I and II, and No. 21 Mks I and II—The explosion of the fuze magazine ignites the burster charge, which transmits its flash to ignite the primed cambric tube, the primed strips around the central tube, the primed washers, and the flash units. The ejection of the flash units is the same as for the Bomb No. 1 Mk I.

No. 21 Mk III and IC Bombs: The operation of these bombs, when nose-fuzed, is the same as that for the Mks I and II of the T.I. Bombs No. 7 and No. 21. When tail-fuzed, the flash is transmitted from the tail fuze to the nose

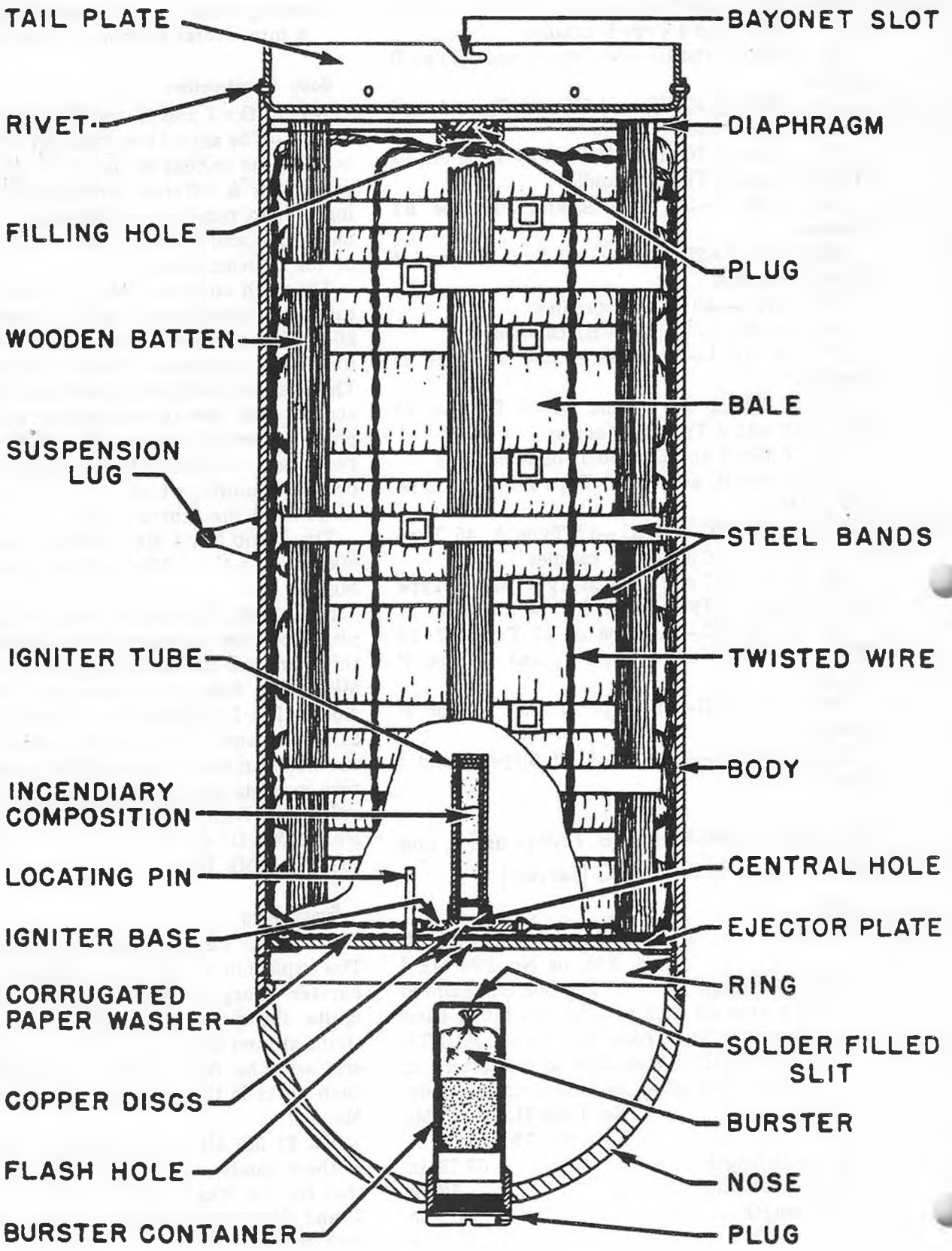


Figure 77—T.I. 250-lb., Spot Fire, Bomb No. 8 Mk I

burster by the primed cambric tube which meanwhile ignites the units. Ejection is the same as for the Bomb No. 1 Mk III.

Tail Construction: Same as for the No. 1 T.I. bomb tails.

Suspension: The bomb is suspended by a single lug, which is welded to the body.

Filling: No. 7 Mks I and II and No. 21 Mks I and II, 210 red flash units; No. 21 Mks III and IC, 208 red flash units.

Remarks: This bomb is used to distinguish a genuine ground marker from one simulated by the enemy.

T.I. 250-lb., Spot Fire, No. 8 Mk I, IC, II, and III (Service)

Data

Fuzing .....Nose Fuze No. 860 Mk II, No. 848, or No. 896 Mk I; Tail Fuze No. 867 Mk I

Color markings.....The bomb is painted black over-all with a ½-in. red filling band, 8 in. from the nose. SPOT FIRE in red, green, or yellow letters, according to the filling, is stencilled on the nose; and SPOT FIRE, preceded by the appropriate color, is stencilled on the body in white.

Tail No. .....No. 1 Mk II, No. 35 Mk I, or No. 75 Mk II

Over-all length .....67.75 in.

Body diameter .....12 in.

Tail length .....27.2 in.

Tail width .....11.7 in.

Total weight .....Mk I and IC, 205 lb.; Mk II and III, 215 lb.

Burning time .....Red, 20 min. (approx.); green and yellow, 1 hr. (approx.)

Body Construction

Mk I Body—The bomb body, tail plate, and burster are the same as those used in the T.I. Bomb No. 1 Mk I. However, the burster container has a crossed slit on its inner end, filled with solder, to pass the flash from the burster charge to an igniter located in the impregnated bale.

The ejector plate is held by screws against a steel ring welded to the inside edge of the nose. The ejector plate has a central flashhole covered by a thin copper disc, which has two crossed slits filled with solder. Three locating pins are welded to the ejector plate, and locate the bale igniter centrally over the flash hole.

The filling bale consists of rolled cotton wool enclosed in cheesecloth, and held together by wire and steel bands. Six wooden battens extend from the ejector plate to the tail plate and serve to force off the tail plate when the bomb functions.

The igniter at the nose end of the bale consist of an igniter base into which a tube filled with incendiary composition is screwed. A central hole in the igniter base is located above the flash hole in the ejector plate, and has a similar closing disc of copper with a solder-filled cross slit.

A diaphragm, soldered to the bomb body under the tail plate, holds the bale in place.

Mark II Body—The Bomb Mk II differs from the Mark I only in general body construction, as the T.I. Bomb No. 1 Mk II differs from the No. 1 Mk I.

Mk III Body—The Bomb Mk III is similar in body and tail plate construction to the T.I. Bomb No. 1 Mk III. The internal arrangement of the filling is similar to that in the Bomb No. 8 Mk 1. However, as this bomb is arranged for tail fuzing, a length of instantaneous fuse leads from the tail fuze pocket, through a steel tube located along the inside of the bomb body, and into the forward end of the burster container. A burster capsule is attached to each end of the fuze.

Mk IC Body—The Mk IC bomb differs from the Mk III as the T.I. Bomb No. 1 Mk IC differs from the No. 1 Mk III.

Functioning

Mk I and II—The functioning of the fuze ignites the burster charge, which simultaneously ruptures the three soldered cross slits, to initiate the incendiary charge in the igniter, and forces the ejector plate toward the rear, causing the wooden battens to push off the tail plate and eject the bale. The incendiary charge in the igniter heats its tube until the impregnated cotton wool in the bale catches fire.

Mk III and IC—The operation, when nose-fuzed, is the same as for the Mks I and II, and, when tail-fuzed, differs only in that the flash from the tail-fuze magazine is transmitted

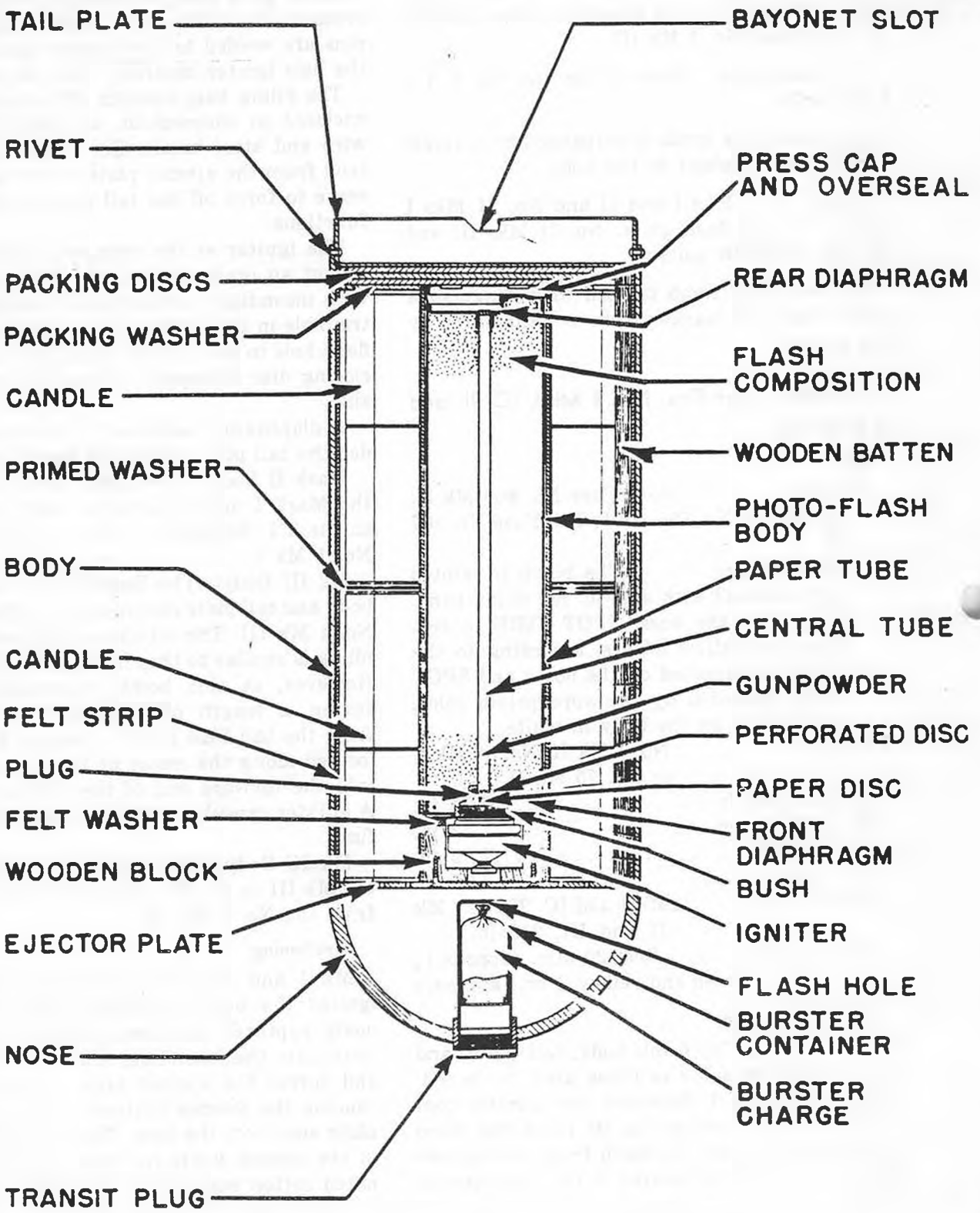


Figure 78—T.I. 250-lb., Photoflash, Bomb No. 13 Mk I

to the burster container by the instantaneous fuze, where the burster charge is ignited by the burster capsule.

Tail Construction: Same as for the T.I. Bomb Tails No. 1.

Suspension: The bomb is suspended by a single lug, which is welded to the body.

Filling: The filling consists of a bale of color-impregnated cotton wool.

T.I. 250-lb., Photoflash, No. 11 Mk I, No. 12 Mk I, and No. 13 Mks I and II (Service)

Data

Fuzing .....Nose Fuze No. 860 Mk II, No. 848, or No. 896 Mk I
Color markings .....The bomb is painted black over-all with a ½-in. red filling band 8 in. from the nose. A colored band on the nose indicates the color of the candles in the bomb, while the color is also stencilled in the appropriate shade on the body. PHOTOFLASH is stencilled in white letters on the nose.
Tail No. .....No. 1 Mk II, No. 35 Mk I, or No. 75 Mk II
Over-all length .....67.75 in.
Body diameter .....12 in.
Tail length .....27.2 in.
Tail width .....11.7 in.
Total weight .....210 lb. (approx.)
Flash illumination period.....0.1 sec.

Body Construction: The Bombs No. 13 Mk I and Mk II have bodies, base plates, and burster containers identical to those of the corresponding marks of the T.I. Bombs No. 1.

The ejector plate is perforated and has a wooden block attached to it by screws. This block houses the photoflash igniter. The photoflash unit has a thin metal body, and a central burster tube filled with black powder.

The candles are arranged in two layers around the central flash unit. A primed cambric washer is located between the primed ends of the two layers.

Functioning: When the fuze functions, it ignites the burster charge, whose flash initiates both the photoflash igniter and the primed cambric disc, which ignites the candles. The expanding gases of the burster eject the flare contents. The candles function in their normal manner, and the photoflash unit explodes with a vivid, white flash about two seconds after ejection.

Tail Construction: Same as for the No. 1 T.I. bomb tails.

Suspension: The bomb is suspended by a single lug, which is welded to the body.

Filling: The filling of the Bomb No. 13 consists of a photoflash unit, and 40 Type A candles.

Remarks: Both the 250 lb. T.I. Bombs No. 11 and No. 12 were manufactured in limited numbers, and have been superseded by the Bomb No. 13. Both bombs were similar to the No. 13, but the No. 12 was filled with 40 Type B.1 candles packed around the photoflash unit, while the No. 11 contained no candles, the space being packed with sand to act as ballast.

T.I. 250-lb., Skymarker

[No. 14 Mks I, IC, II, and III, and Change Color, No. 18 Mks I, IC, II, and III (Service)]

Data

Fuzing .....Nose Fuze No. 860 Mk II, No. 848, or No. 896 Mk I; Tail Fuze No. 867 Mk I
Color markings.....The bombs are painted black over-all with a ½-in. red filling band 8 in. abaft the nose. The Bombs No. 14 have a colored nose band to indicate the color of the candles used, as well as having the color stencilled on the bomb body. SKYMARKER is stencilled on the nose and body in white. The Bomb No. 18 has two ½-in. rings around the nose to indicate the colors of the candles. The appropriate colors are also stencilled on the bomb body. CHANGE COLOR is stencilled on the nose and body in white.
Tail No. .....No. 1 Mk II, No. 35 Mk I, or No. 75 Mk II
Over-all length .....67.75 in.
Body diameter .....12 in.
Tail length .....27.2 in.
Tail width .....11.7 in.
Total weight .....220 lb. (approx.)
Burning time.....No. 14, 3 min.; No. 18, 5½ min.

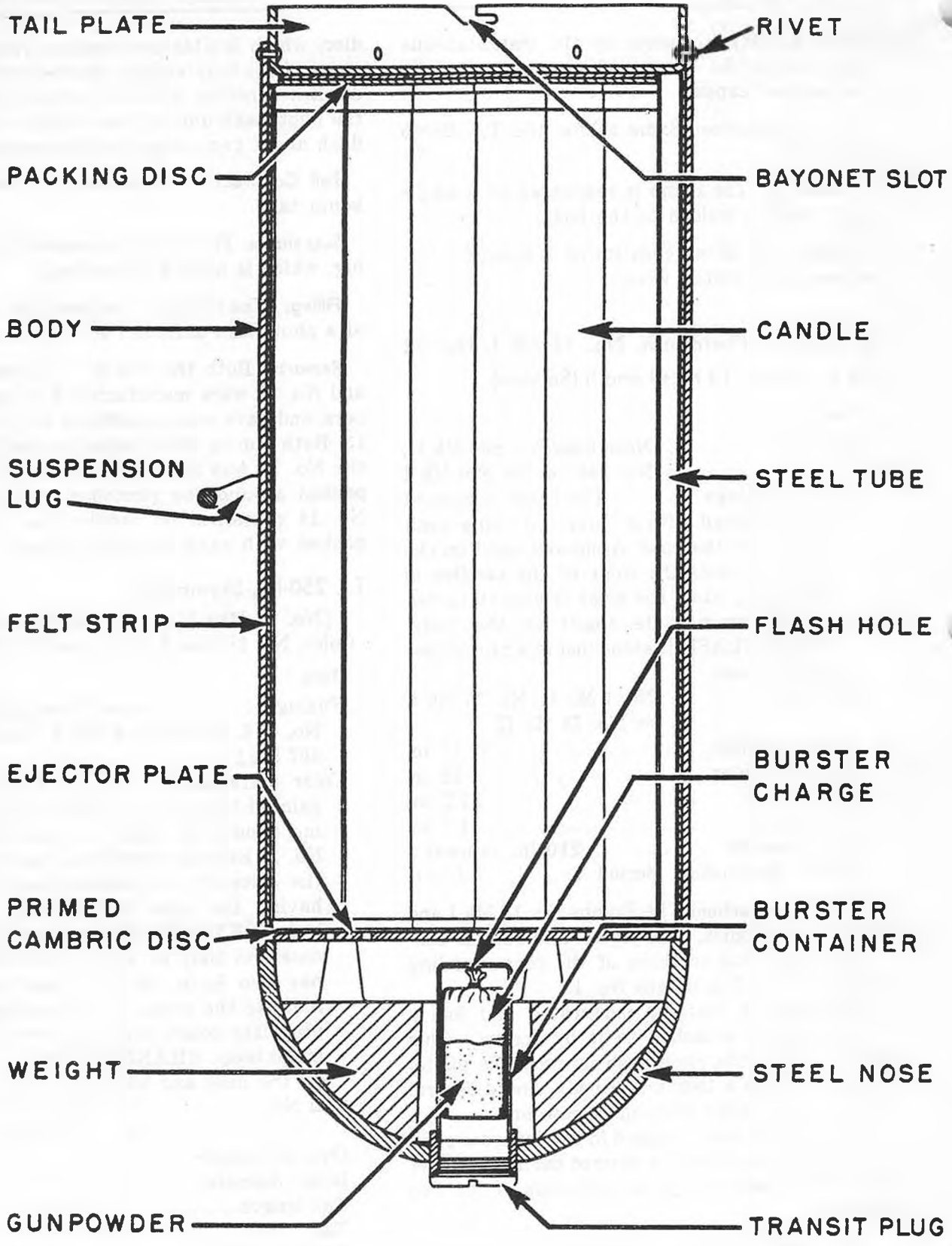


Figure 79—T.I. 250-lb., Skymarker, Bomb No. 14 Mk I

Body Construction:

No. 14 Mks I and II, and No. 18 Mks I and II —The body, tail plates and burster containers of these bombs are the same as those of the No. 1 Mks I and II. In addition, the No. 14 Mk I has a nose weight of cast iron. The Bombs No. 14 and No. 18 have no central flash tube, but use double-length candles, whose primed ends rest against a primed cambric disc on the perforated ejector plate. Steel tubes may be substituted for wooden battens.

No. 14 Mks III and IC, and No. 18 Mks III and IC—The body, tail plate, burster container, central flash tube, and tail-fuze adapter of these bombs are identical to those on the corresponding marks of the T.I. Bombs No. 1. The Nos. 14 and 18 have an unperforated central tube and no division disc, as double-length candles are used. The candle's primed ends rest against a primed cambric disc on the perforated ejector plate.

Functioning: No. 14 Mks I and II, and No. 18 Mks I and II—Functioning of the fuze ignites the burster charge, which flashes through the perforated ejector plate to ignite the cambric and candles, and ejects the candles after forcing off the base plate.

No. 14 Mks III, and IC, and No. 18 Mks III and IC—If nose-fuzed, these bombs function the same as the Mks I and II, except that the central tube instead of battens forces off the tail plate. If tail-fuzed, the flash of the fuze is carried by the primed cambric tube to the nose burster charge, after which the operation is the same.

Tail Construction: Same as for the T.I. Bomb Tails No. 1.

Suspension: The bomb is suspended by a single lug, which is welded to the body.

Filling: No. 14, 24 Type G candles; No. 18, 24 Type H candles.

T.I. 250-lb., Sea Marker, No. 19 Mks I and II (Service)

Data

Fuzing....Nose Fuze No. 860 Mk II, No. 848, or No. 896 Mk I

Color markings....The bomb is painted black over-all with a ½-in. red filling band 8 in. from the nose. SEA MARKER-FLAME is stencilled on the nose, and SEA MARKER is stencilled on the bomb body.

Tail No.....No. 1 Mk II, No. 35 Mk I, or No. 75 Mk II

Over-all length .....67.75 in.
Body diameter .....12 in.
Tail length .....27.2 in.
Tail width .....11.7 in.
Total weight .....180 lb. (approx.)
Burning time .....5 to 8 min. (approx.)

Body Construction: The body, tail plate, and burster container of the Bombs No. 19 Mk I and Mk II are the same as those of the corresponding marks of the T.I. Bombs No. 1.

The ejector plate is secured by screws to a ring, which is welded to the inner edge of the nose. A cannister of thin steel rests on the ejector plate, and is held in position by a thin diaphragm soldered to the inside of the body just beneath the tail plate. The inside of the cannister is divided in two by a thin dished plate. The upper part of the cannister forms a buoyancy chamber, while the lower part is filled with a sodium phosphide-phosphorus mixture. The lower part of the cannister is pierced by several water-inlet holes, which are covered by wire netting. Six wooden battens extend along the outside of the cannister to force off the tail plate.

Functioning: When the fuze functions, the flash from its magazine ignites the burster charge, which forces the ejector plate aft, shearing its securing screws and ejecting the cannister.

When the cannister falls into the sea, the buoyancy chamber keeps it afloat while water enters the inlet hole and reacts with the chemical filling to produce impure phosphine gas. This gas escapes through the water-inlet holes and ignites spontaneously on contact with air to give a luminous flame about three feet long, as well as a cloud of dense white smoke.

Tail Construction: Same as for the No. 1 T.I. bomb tails.

Suspension: The bomb is suspended by a single lug, which is welded to the body.

Filling: The bomb is filled with a sodium phosphide-phosphorus mixture.

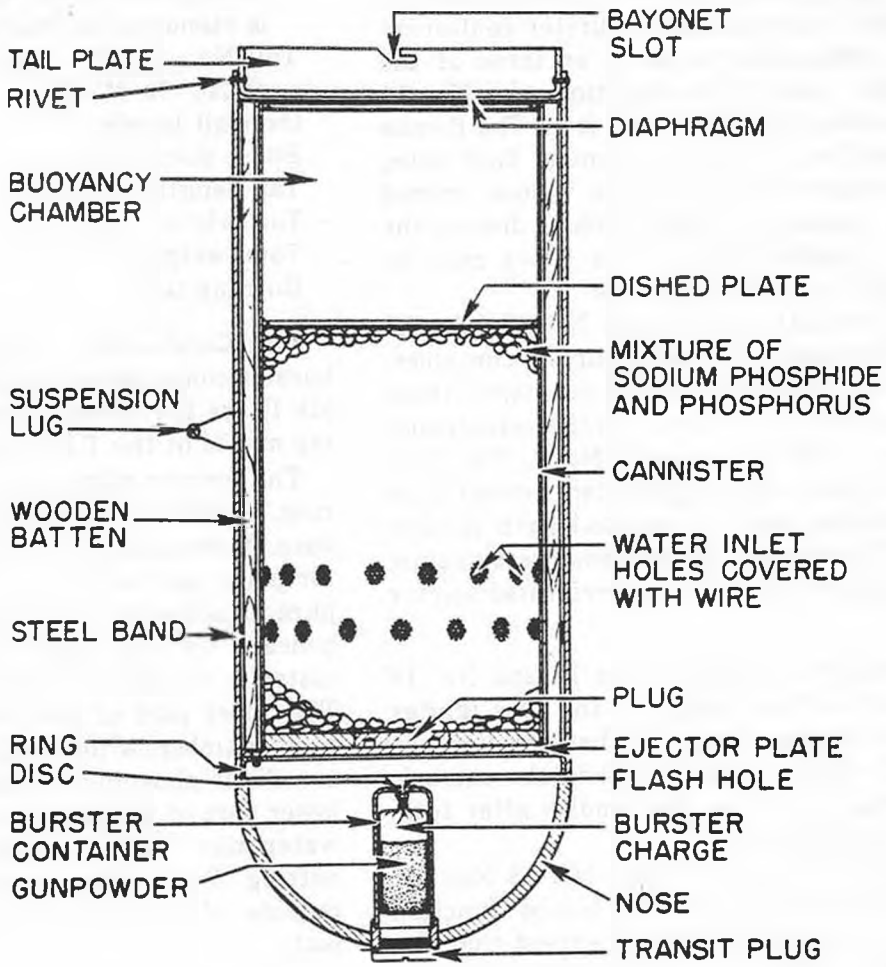


Figure 80—T.I. 250-lb., Sea Marker, Bomb No. 19 MK I

T.I. 1,000-lb.

[No. B.2 Mk I, No. B.4 Mk I, No. B.16 Mk I, No. B.22 Mk I, No. B.24 Mk I, No. B.25 Mk I, No. B.26 Mk I, No. B.28 Mk I, and No. B.29 Mk I (Service)]

Data

Fuzing.....Tail Fuze No. 867 Mk I, or nose fuze No. 896 Mk I. Bomb No. B.29 is nose-fuzed only, with Nose Fuzes M111, M111A1, M111A2, No. 42 Mks II, II*, IM, or III, No. 848 Mks I-V, or No. 849 Mks I or III.

Color markings.....Black over-all with red band around nose end, and 2-in. ring around nose to indicate color of contents; "X" stencilled in red when explosive candles are used.

Tail No. .....No. 57 Mk I

Over-all length .....73.6 in.

Body diameter .....17 in.

Tail length .....20 in.

Tail width .....17.4 in.

Body length .....53.6 in.

Total weight....560 lb. (approx.); No. B.29, 730 lb. (approx.)

Body Construction: The bomb consists of a cylindrical body with a dome-shaped nose cap welded on. The after body of the bomb consi of a sheet steel body cone. This after cone section is welded to a steel tail plate, which is

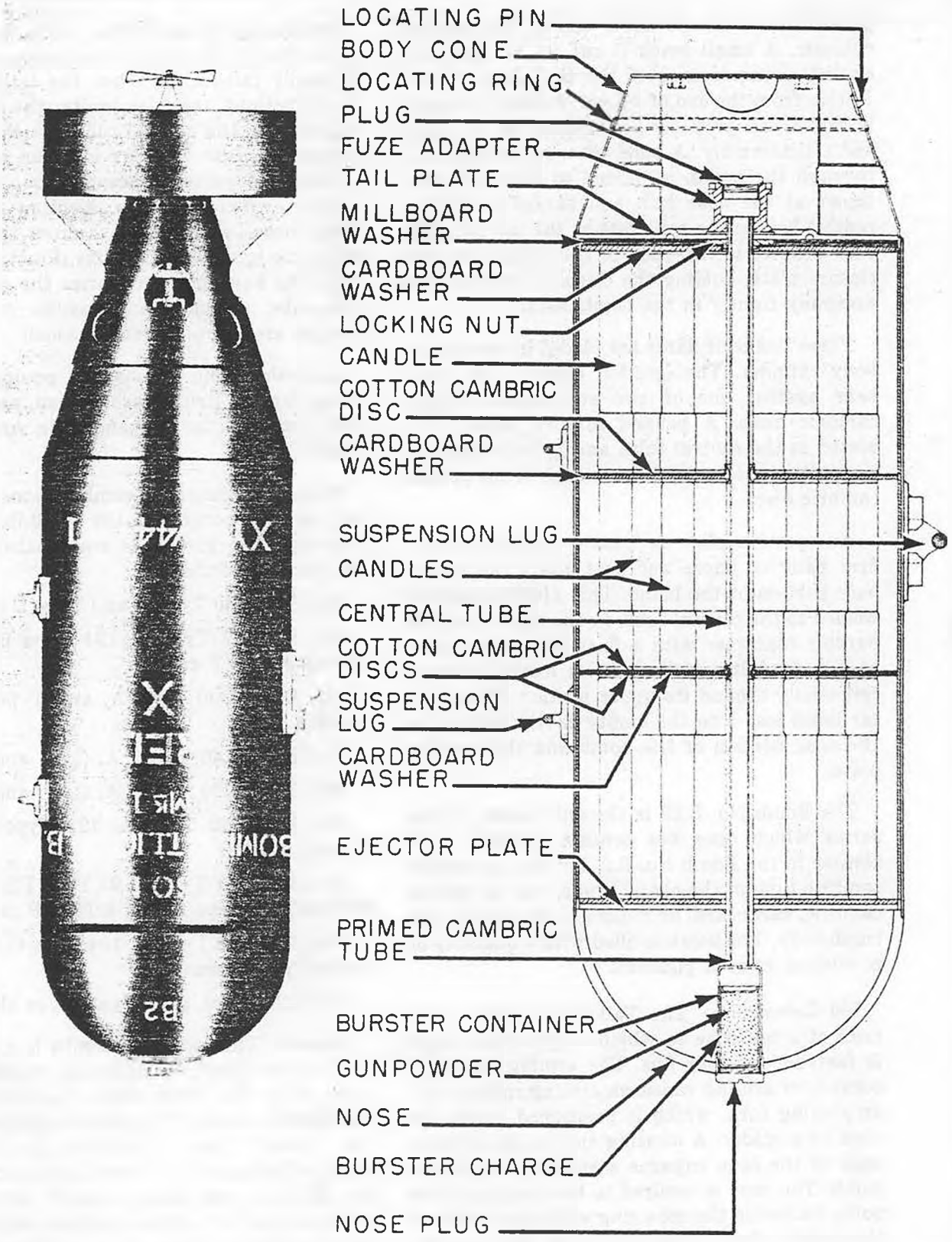


Figure 81—T.I. 1,000-lb. Bomb No. B. 2 Mk I

press-fitted into the after end of the central cylinder. A small notch is cut out at one point on the circumference of the tail plate. A projection from the end of the central body engages in this notch, properly positioning the tail plate and tail assembly. A steel tube, running axially through the bomb, is welded to a burster container at the nose end, and passes through a central hole in the tail plate at the tail end. The fuze adapter is threaded to this tube abaft the closure plate, holding the closure plate and tail assembly tightly in the bomb body.

Three banks of flares are placed in the central body cylinder. The ignition ends of the flares bear against one of two equispaced, primed cambric discs. A primed cambric tube is inserted in the central tube, and holes in the central tube provide a lead out to each of the primed cambric discs.

An ejection plate is located just before the first bank of flares and just abaft the hollow nose portion of the bomb. This ejection plate is welded to the central tube. In the nose is a short burster container with a flash hole in its after end, and additional flash holes located circumferentially around its upper portion. These latter holes lead into the empty cavity formed by the nose portion of the bomb and the ejection plate.

The Bomb No. B.29 is the only bomb of this series which does not contain candles. It is similar to the Bomb No. B.2, but has no primed cambric tube in the central tube, and no primed cambric, cardboard, or millboard washers in the bomb body. The bomb is filled with a quantity of powdered, colored pigment.

Tail Construction: The Tail No. 57 Mk I consists of a tail cone to which a cylindrical strut is fastened by four fins. The arming assembly consists of arming vanes, an arming spindle, and an arming fork, which is positioned inside the cone by a spider. A locating slot in the forward edge of the cone engages a locating pin on the bomb. The cone is secured to the bomb by four bolts, housed in the cone ring which is riveted to the inside of the cone. The cone also has two celluloid inspection windows set into it.

Functioning: These bombs, with the exception of the No. B.29 which is always nose-fuzed, are generally tail-fuzed. When the tail-fuze magazine functions, the flash ignites the primed cambric tube in the central tube, which ignites the primed cambric washers and the candles. The cambric tube also passes the flash to the nose burster, which explodes, ejecting the candles. When nose-fuzed, the flash from the nose-fuze magazine ignites the burster directly. The flash from the burster then ignites the primed cambric tube, washers, and candles in turn. The candles are ejected simultaneously.

Suspension: The bombs are equipped with a single lug for British suspension, and two lugs, 180° removed, for suspension in American aircraft.

Filling: A number of combinations of candles may be incorporated in the 1,000-lb. bomb. The following list gives the combinations used in the various bombs:

No. B.2—200 Type A and Type D candles

No. B.4—62 Type A, 124 Type B2, 10 Type D, and 4 Type F candles

No. B.16—200 Type A, and Type B1 or B2 candles

No. B.22—140 Types A, C, D, and F candles

No. B.24—200 Types A, C, D, and F candles

No. B.25—12 Type A, 121 Type B3, and 9 Type E candles

No. B.26—31 Type A, 93 Type B2, 62 Type C, 6 Type D, 4 Type F, and 4 Type P candles

No. B.28—62 Type A, 104 Type C, 10 Type D, and 4 Type F candles

No. B.29—Red, green, yellow, or blue pigment

Remarks: This series of bombs is a larger version of the 250-lb. T.I. Bombs, with the exception of the No. B.29, which has no parallel in the 250-lb. series. The individual bombs within the 1,000-lb. series, including the Bomb No. B.29, differ mainly in their contents. The Bomb No. B.29 is used as a daylight skymarker. It emits a cloud of colored pigment which is effectively visible for about four minutes. This bon is called the "Skymarker Puff."

FLARES AND PHOTOFLASH BOMBS

Introduction

This chapter includes the 4-in., 4.5-in., and 5.5-in. reconnaissance flares, the 7-in. hooded flare, the 4.5-in. photoflash bomb, and the 1.7-in. aircraft illuminator.

Reconnaissance flares are used as an aid in night reconnaissance, as an aid to night bombing, and to assist in emergency forced landings. The general construction of these flares is the same, consisting of a flare body, a flare candle, and a parachute which supports the candle after the flare has functioned. These flares can be stowed inside the aircraft and dropped from a launching chute, or they may be fitted to a bomb or flare carrier. However, they are most commonly carried in Cluster Projectiles.

The hooded flare has the conventional flare body and parachute, and also a special flare candle to which an asbestos shield is attached. This shield, which is folded when contained in the flare body and opens on ejection, deflects the intense glare from the burning candle downward. This protects the vision of the personnel of the dropping plane, and allows much better observation.

Photoflash bombs are used to provide illumination for night photography. They contain a flash composition, which explodes with a loud report and a vivid white flash to provide the intense, instantaneous illumination necessary for night photography.

Aircraft illuminators are small flares which contain illuminating stars, but no parachute. They have a short, three-second period of illumination, and are used by intercepting aircraft for illuminating attacking enemy planes at night.

Aircraft Illuminator Flare No. 1 Mks I and II (Service)

Data

Fuzing.....Special, integral electric fuze
Color markings .....Brown over-all
Over-all length....Mk I, 11 in.; Mk II, 11.2 in.
Body diameter .....1.7 in.
Total weight .....12 oz. (approx.)
Candlepower 3,000,000
Burning time.....3 sec. (approx.)

Description: The flare consists of a cylindrical body, which houses three illuminating stars. At the lower end of the body is a conical wooden nose, which insures easy entry of the flare into the funnel tube of an ignition chute. The upper end of the body is closed by a wooden plug and a metal disc, the weight of which facilitates the passage of the flare through the chute and offsets the up-draught and air drag as the flare leaves the aircraft.

Each star is primed at both ends and has a short strip of primed fabric wrapped around the star and held in position by two threads. A long strip of primed fabric extends along the sides of the three stars and is held in position by three additional threads, one around each star, at a position between the threads securing the short strip.

Between the metal disc and the top of the upper star is an apertured felt washer which contains a charge of gunpowder. A primed fabric disc is located between the bottom of the lower star and the upper surface of the nose. Vent holes are provided in the nose, whose open ends are sealed with paper sealing discs.

Two copper strips pass along the outside of the body beneath a paper wrapper surrounding the body. Their lower ends are connected to the leads from the electric fuze, and their upper ends emerge from, and are secured by, wire staples to the wrapper. The portion of the outer surface of the paper wrapper surrounding the staples is sprayed with zinc to form contact bands.

The Flare No. 1 Mk II is identical to the Flare Mk I, with the following exceptions. The upper end of the body is closed by a metal cap, and the nose is made of moulded plastic material.

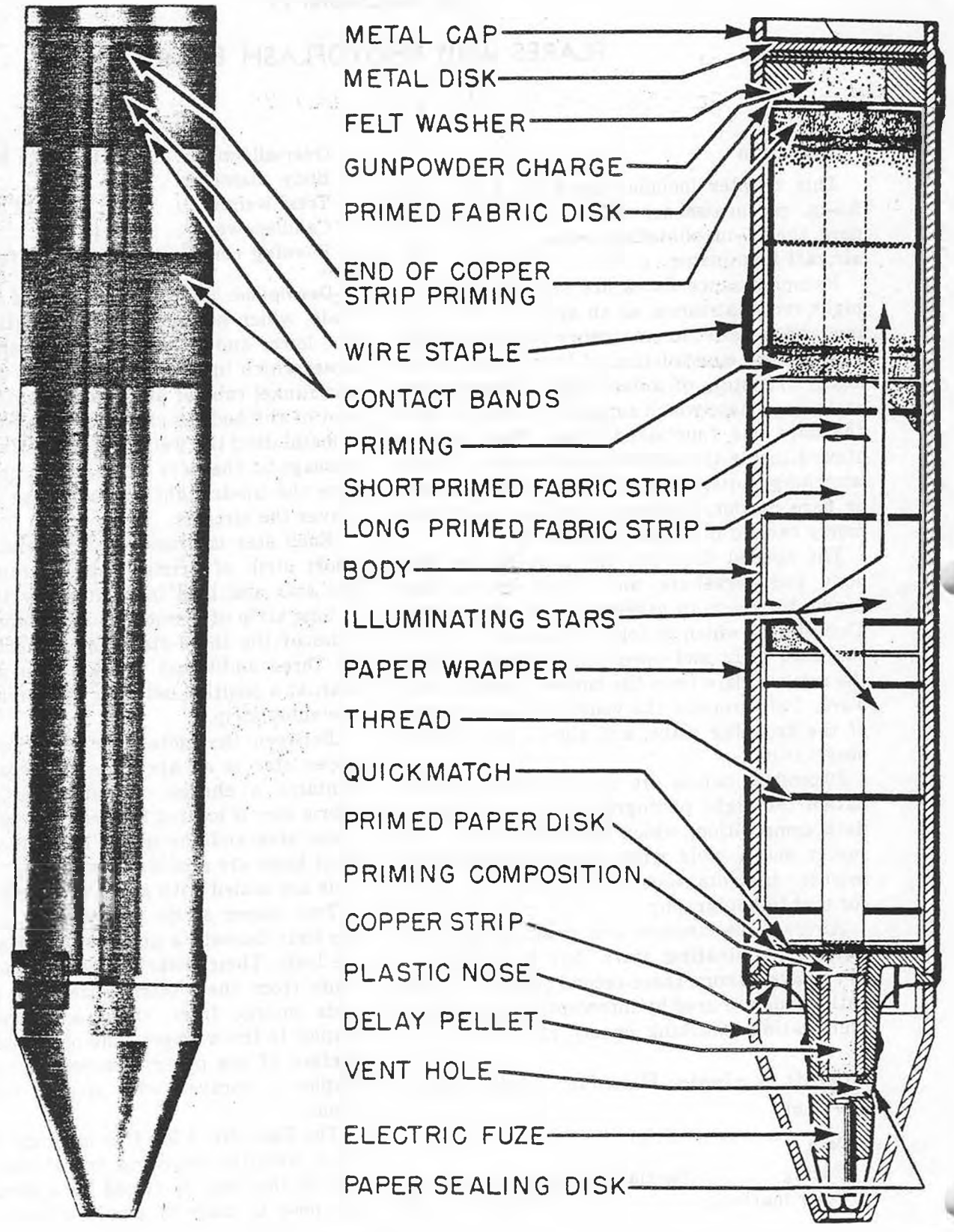


Figure 82—Aircraft Illuminator Flare No. 1 Mk II

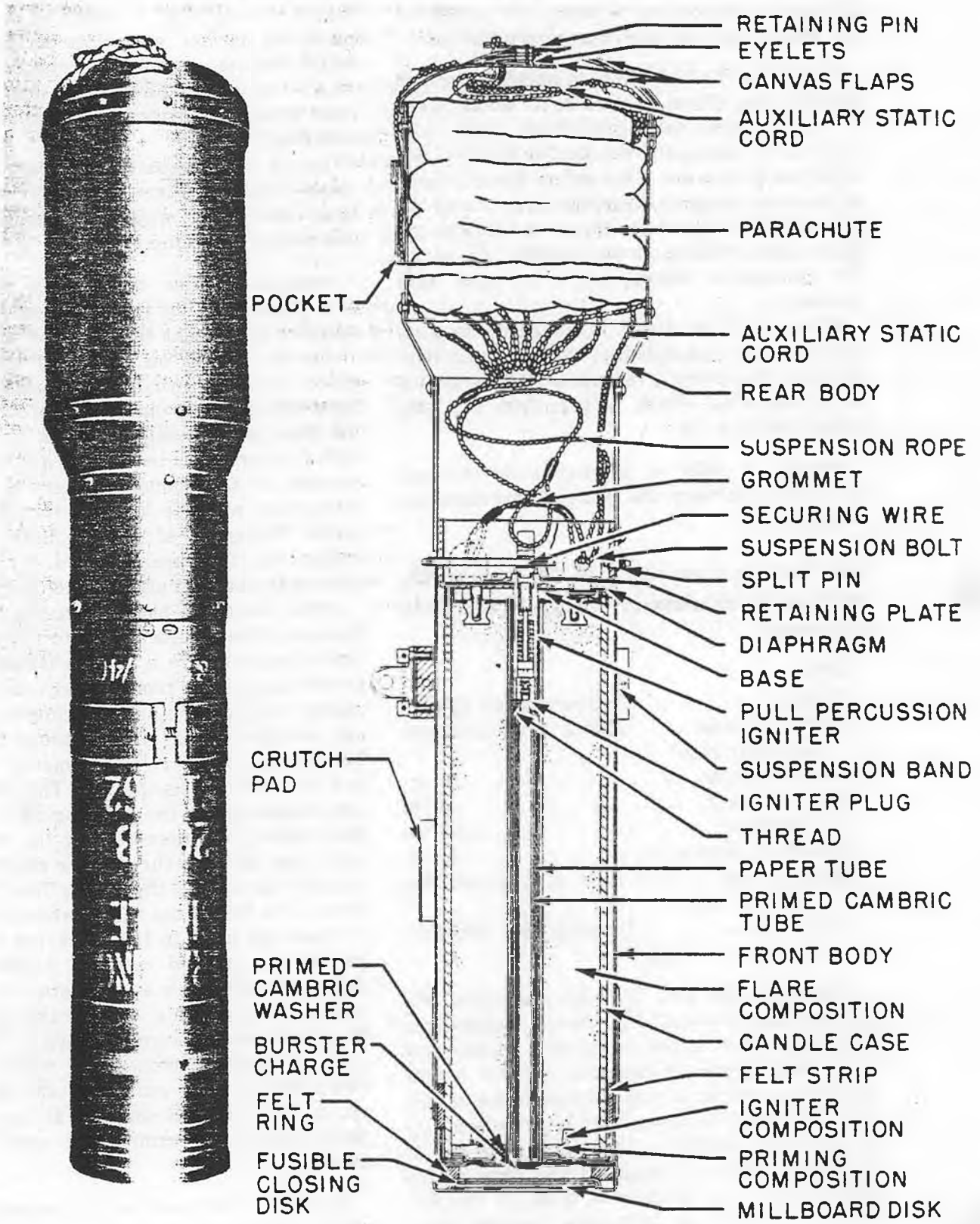


Figure 83—4-in. Training Flare Mk IV

A pellet of delay composition is used instead of the length of delay safety fuse, and a length of quickmatch is located between the bottom of the lowest star and the priming composition.

Functioning: When the flare is launched through the ignition chute, the contact bands make rubbing contact with the spring wiper contacts in the chute, and the electric fuze is fired. This fuze ignites the delay safety fuse, igniting the priming composition, which in turn fires the long primed fabric strip. This strip initiates the short primed fabric strips, igniting the stars. The gunpowder charge ejects the stars from the body.

When the Flare Mk II is launched, the electric fuze fires the pellet of delay composition, initiating the priming composition. This ignites the quickmatch, which in turn fires the long primed fabric strip.

Remarks: A delay of approximately two seconds occurs between the release of the flare and its ignition.

4-in. Training Flare Mks I, III, IV, VII, and VIII, and 4-in. Reconnaissance Flare, A.S., Mks I and II (Service)

Data

Fuzing .....Pull-percussion igniter
Color markings.....Black with ½-in. red band near nose
Over-all length .....30 in.
Body diameter .....4 in.
Tail diameter .....5.5 in.
Parachute diameter .....11 ft.
Burning time....A.S. flare, 50 sec.; training flare, 3.25 min.
Candlepower.....Training flare, 600,000; A.S. flare, 2,000,000

Description: The 4-in. Training Flare Body Mk IV comprises a front body portion containing a flare candle and a pull percussion igniter, and a rear body portion containing an 11-ft. cotton parachute, which is connected with the candle unit. The front and rear body portions are connected by a diaphragm, which closes one end of the front body and supports the flare candle and igniter. Two suspension bolts on the diaphragm provide an anchorage for the parachute. The opposite end of the front body is closed by a millboard disc held in place by a fusible closing disc. In addition to the igniter plug, the igniter comprises an igniter body, which houses a striker mechanism, and into which the igniter plug is screwed. The igniter body is held in place in the central tube by a retaining plate.

The A.S. Reconnaissance Flare is identical to the Training Flare except for a delay fuze below the igniter, which gives about a 5-second delay before burning starts.

Functioning: When the flare is released, the long static cord, the free end of which has been attached to the rear crutch holder of the carrier or to the eyebolt on the lid of the launching chute, is withdrawn from the elastic loop and pulls the retaining pin out of the loop on one of the flaps, thus releasing all flaps. The flare falls, with the parachute being drawn out of the body because of the connection between the short static cord and the long cord attached to the plane. Tautening of the auxiliary static cord breaks the thin braided cord, separating the flare from the cord attached to the plane.

After the chute has opened, the body of the flare continues momentarily to fall freely until the suspension rope is fully tensioned. The jerk as the suspension rope tightens causes the securing wire to bend and the clutch to be pulled out, spring-loading and releasing the striker. The striker, when released, moves downwards and fires the percussion cap. This flash ignites the gunpowder in the training flare, sending a flash down the center tube by the primed cambric tube, igniting the burster charge. (A percussion cap ignites the safety fuse in the A.S. flare.) The flash from the burster charge passes through the holes in the apertured washer and ignites the primed cambric washer and the priming composition at the bottom of the flare candle. The priming composition ignites the flare composition, being assisted by the six portions of igniter composition which ensure a substantially even ignition of the flare composition. The fusible closing disc at the nose of the flare melts and permits the candle to burn freely.

Suspension: The flare has a suspension band to which the lug is attached.

Remarks: The 4-in. Training Flare Mk I has a silk parachute, and a safety pin held by a split pin instead of a securing wire. The flash from the gunpowder is conveyed to the burster charge by a length of instantaneous fuze instead of by a primed cambric tube as in the Flare Mk IV. The 4-in. Training Flare Mk III has a silk parachute, but it is a stronger one than is used in the Flare Mk I. The 4-in. Training Flare Mk VII has a slightly different cotton parachute than the Flare Mk IV. The 4-in. Training Flare Mk VIII has an igniter fitted with a copper shear wire, which passes through holes near the top of the igniter body and in the clutch. The shear wire is fitted to assist assembly during manufacture. It is broken by the jerk which bends the securing wire and pulls out the clutch. The parachute is similar to that of the Mk VII.

The 4-in. A.S. Reconnaissance Flare Mk II has the same changes as 4-in. Training Flare Mk VIII.

These flares are used primarily for training purposes, and, after being dropped from an aircraft, are supported by their parachutes even if they are not ignited. The flares can also be used to assist in making an emergency landing during night flying.

4.5-in. Reconnaissance Flare Mks I, II, III, IV, and VII, and Target Flare Mk I (Service)

Data

Fuzing....Nose Fuze No. 35, 42, 848, or 849. May use No. 28B Mks II or III, or No. 860 with special permission.
Color markings....Black over-all with ½-in. red band around nose end
Over-all length .....33 in.
Body diameter .....4.5 in.
Parachute diameter .....11 ft.
Total weight .....23 lb.
Burning time ..... 3-4 min.
Candlepower 750,000

Description: The Flare Mk IV has a tubular body containing the candle unit, and the parachute, which is made of cotton. The tail end of the body is closed by a closing dome, and has four tail fins.

The body is closed at the nose end by a diaphragm having a bush into which is screwed a nose plug or the fuze. The flare composition is contained in a candle case together with some priming composition and a primed cambric disc at the nose end, a quantity of clay held between millboard discs, and a felt washer at the tail end. A lid is riveted to the tail end of the candle case. A shackle attached to the lid connects the candle unit with the suspension rope of the parachute.

Functioning: When the fuzed flare is released from the plane, the fuze is set in operation and the flare drops freely until the flash from the magazine charge of the fuze passes through the flash hole in the diaphragm and ignites the powder puff. The gases formed by the burning of the gunpowder in the puff force the candle unit towards the closing dome. The wooden slats push off the dome, thus permitting the candle unit and the parachute to be ejected from the flare body. The flash from the puff ignites the primed cambric disc and the priming composition at the nose of the candle, and the priming composition ignites the flare composition. The candle, which is now suspended on its parachute, continues to burn from the nose end until the flare composition is expended.

Suspension: A suspension band having two removable suspension lugs, one for attaching the flare to a Universal bomb carrier, and the other for attaching it to a Light Series bomb carrier, is secured to the flare body. Seven flares may be carried in Cluster, No. 1 Mk I, and four in S.B.C. 250-lb.

Remarks: The 4.5-in. Reconnaissance Flare Mk I is similar to the Flare Mk IV, but has larger tail fins, a Silk Parachute Mk II, a brass disc over the flash hole in the diaphragm, and a candle case which is not strengthened in the region through which the lid rivets pass. The Reconnaissance Flare Mk II is similar to the Flare Mk IV, but has larger tail fins, a Silk Parachute Mk IV, a brass disc over the flash hole in the diaphragm, and a candle case which is not strengthened in the region through which the lid rivets pass. The Reconnaissance Flare Mk III is similar to the Flare Mk IV, but it has larger tail fins and a brass disc over the flash hole in the diaphragm, and its candle case is not

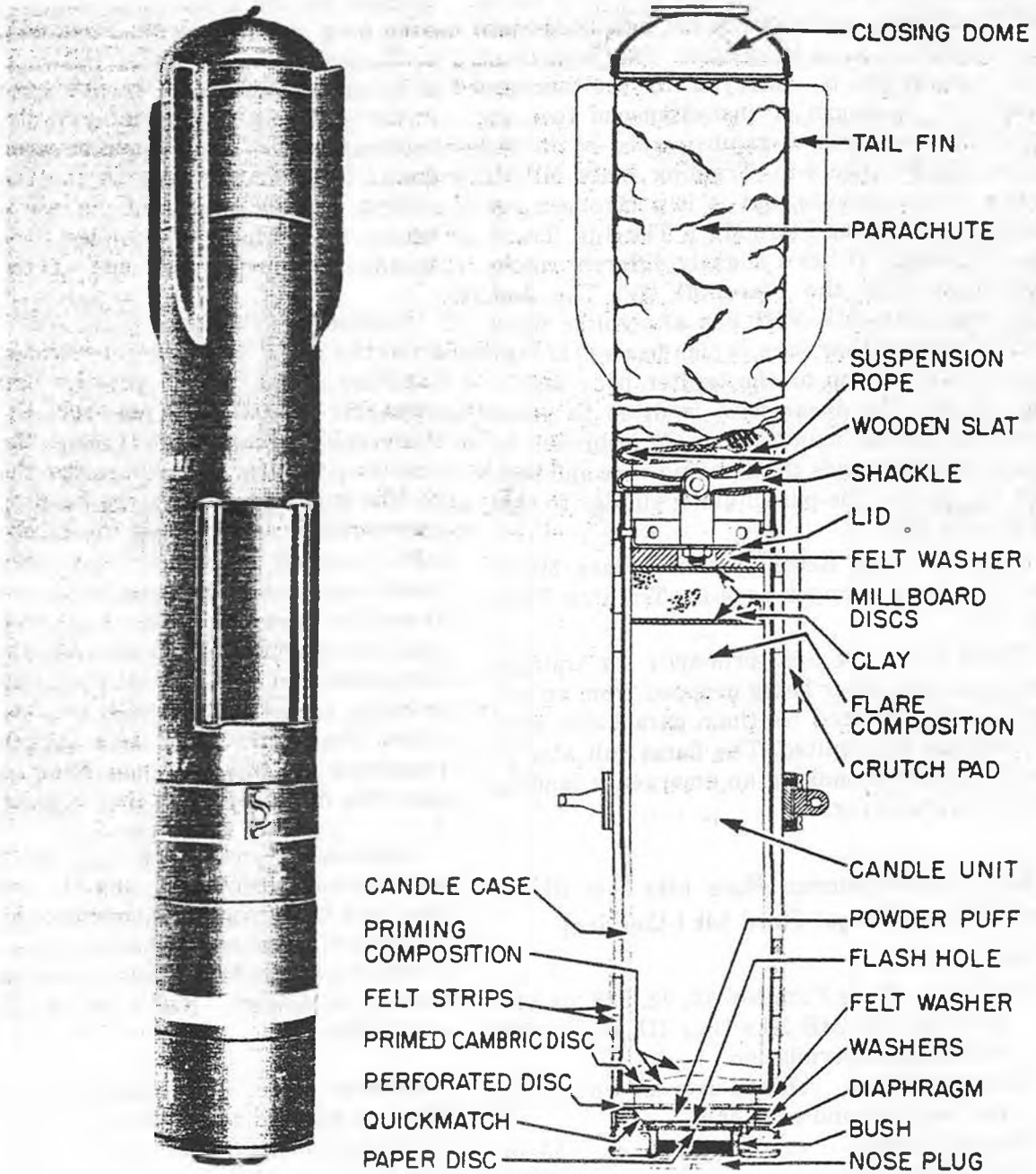


Figure 84—4.5-in. Reconnaissance Flare Mk IV

strengthened in the region through which the lid rivets pass. The Reconnaissance Flare Mk VII is similar to the Flare Mk IV, but has a modified parachute known as the Parachute Mk VF.

The details of the Target Flare No. 1 Mk I are generally the same as in the 4.5-in. Reconnaissance Flare Mk IV, except for the stencilled markings. This flare is manufactured to give two types of steady colors, red or green, or four combinations of colors and stars; green with red stars, red with green stars, red with yellow stars, or green with yellow stars. The red flare has a candlepower of approximately 250,000 while the green flare is rated at approximately 175,000 candlepower. The flares themselves burn for approximately three minutes. T' stars, which burn for about 10 seconds, ar ejected at intervals of approximately 20 seconds.

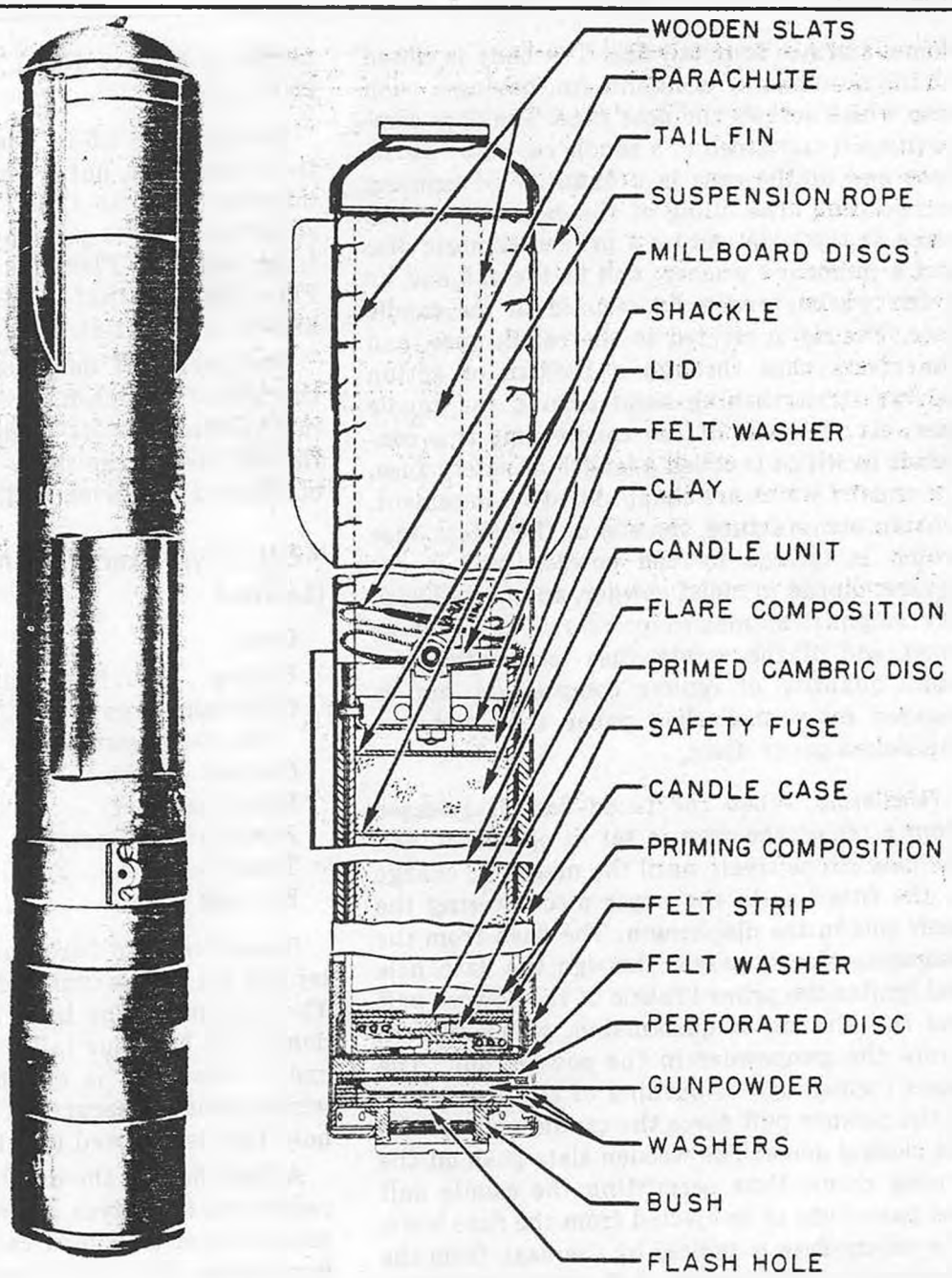


Figure 85—4.5-in. Reconnaissance Flare Mk V

4.5-in. Reconnaissance Flare Mks V, VI, and VIII (Service)

Data

Fuzing....Nose Fuze No. 35, 42, 848, or 849; No. 860 can be used only if specially authorized
Color markings....Black over-all with ½-in. red band around nose end
Over-all length .....33 in.
Body diameter .....4.5 in.
Parachute diameter .....11 ft.
Total weight .....23 lb.
Burning time ..... 3-4 minutes
Delay .....2 min.
Candlepower 750,000

Description: The Flare Mk V has a tubular body containing the candle unit and the Cotton Parachute Mk IVF. The tail end is closed by a closing

dome, and has four tail fins. The body is closed at the nose end by a diaphragm, having a bush into which screws the nose fuze. The flare composition is contained in a candle case, and at the nose end of the case is a quantity of priming composition. The filling of the candle is held in place at the nose end by a primed cambric disc and a millboard washer, and at the tail end by a felt washer and a lid secured to the candle case. The lid is riveted to the candle case, and the rivets pass through a hessian or cotton canvas strengthening band around the candle case. At the nose of the candle unit is a container in which is coiled a length of safety fuse, the ends of which are clamped and set in cement. During manufacture, the end of the safety fuse which is ignited by the powder puff is cut square, dipped in moist powder, and dusted with dry sulphurless mealed powder. The other or inner end of the safety fuse terminates in a small quantity of igniter composition, and is covered by a shellacked paper tube and two shellacked paper discs.

Functioning: When the fuzed flare is released from a plane, the fuze is set in operation, and the flare drops freely until the magazine charge of the fuze bursts the paper disc covering the flash hole in the diaphragm. The flash from the magazine charge passes through the flash hole and ignites the primed fabric of the powder puff and the strands of quickmatch, which in turn ignite the gunpowder in the powder puff. The gases formed by the burning of the gunpowder in the powder puff force the candle unit toward the closing dome. The wooden slats push off the closing dome, thus permitting the candle unit and parachute to be ejected from the flare body. The safety fuse is ignited by the flash from the gunpowder in the powder puff, and after a delay of two minutes, during which time the flare has fallen 2,000 ft. supported by the parachute, the safety fuse ignites the igniter composition at its inner end. The flash from the igniter composition is conveyed by the primed cambric disc to the candle primings, which are ignited and in turn ignite the flare composition.

Suspension: A suspension band around the body has two removable suspension lugs for attaching to a Universal bomb carrier, or a Light Series bomb carrier. Seven flares may be contained in Cluster No. 1 Mk I, and four in the 250-lb. S.B.C.

Remarks: The 4.5-in. Flare Mk VI is similar to the Flare Mk V, but is provided with a 4-minute internal delay, so that the flare falls 4,000 ft. suspended on its parachute, before the candle is ignited. The Flare Mk VIII differs from the Flare Mk V in that it has a modified parachute known as the 11-ft. Parachute Mk VF.

The period of delay of these flares enables the aircraft which has released the flare to get into position for its bombing run and to make the best use of the three- to four-minute period of illumination given by the flare.

4.5-in. Skymarker Flare No. 1 Mks I, II, and III (Service)

Data

Fuzing.....Nose Fuze No. 42, 848, or 849
Color markings.....Black over-all; ½-in. red band near nose
Over-all length .....33 in.
Body diameter .....4.5 in.
Parachute diameter .....11 ft.
Total weight .....28 lb. (approx.)
Burning time .....100 sec. (approx.)

Description: The flare has a tubular body containing the candle unit and the Parachute Mk V. The tail end of the body is closed by a closing dome, and has four tail fins attached. The nose end of the body is closed by a diaphragm to which a bush is secured. The transit plug or the nose fuze is screwed into this bush.

A flash hole in the diaphragm is covered by a paper disc and gives access to a "powder-puff" consisting of a primed cambric bag containing gunpowder. The powder puff is secured to a perforated disc. Its purpose is, with the aid of the perforated disc, to eject the candle unit and parachute from the flare body and to ignite the flare candle.

The candle unit comprises a steel container closed at the top by a lid and at the bottom by a dished washer. In the container is a magnesium alloy candle body containing a small quantity of gunpowder, some priming composition, and a quantity of incendiary composition. The hole in the washer is closed by a primed cambric disc. The candle unit is held in place in

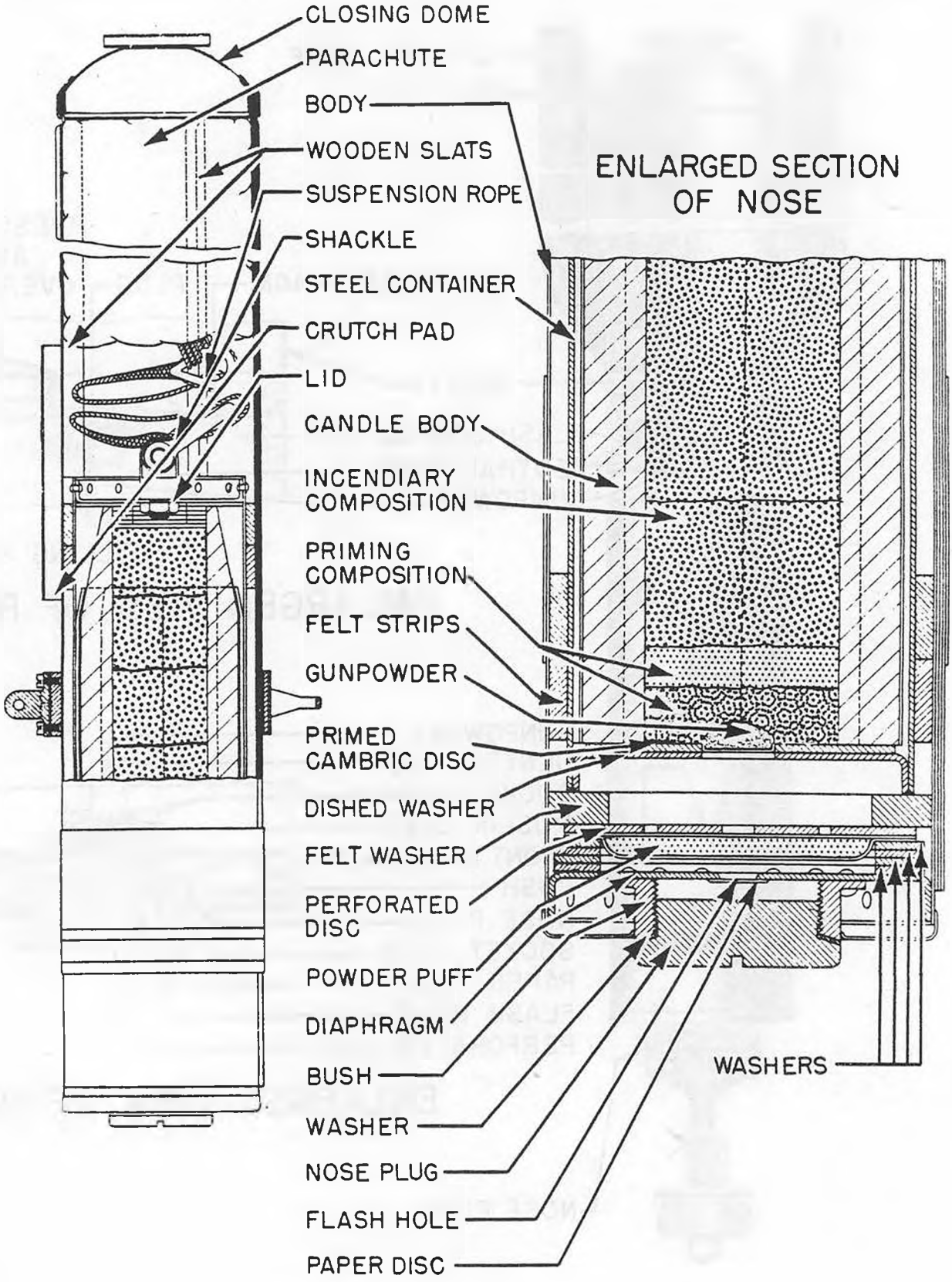


Figure 86—4.5-in. Skymarker Flare No. 1 Mk I

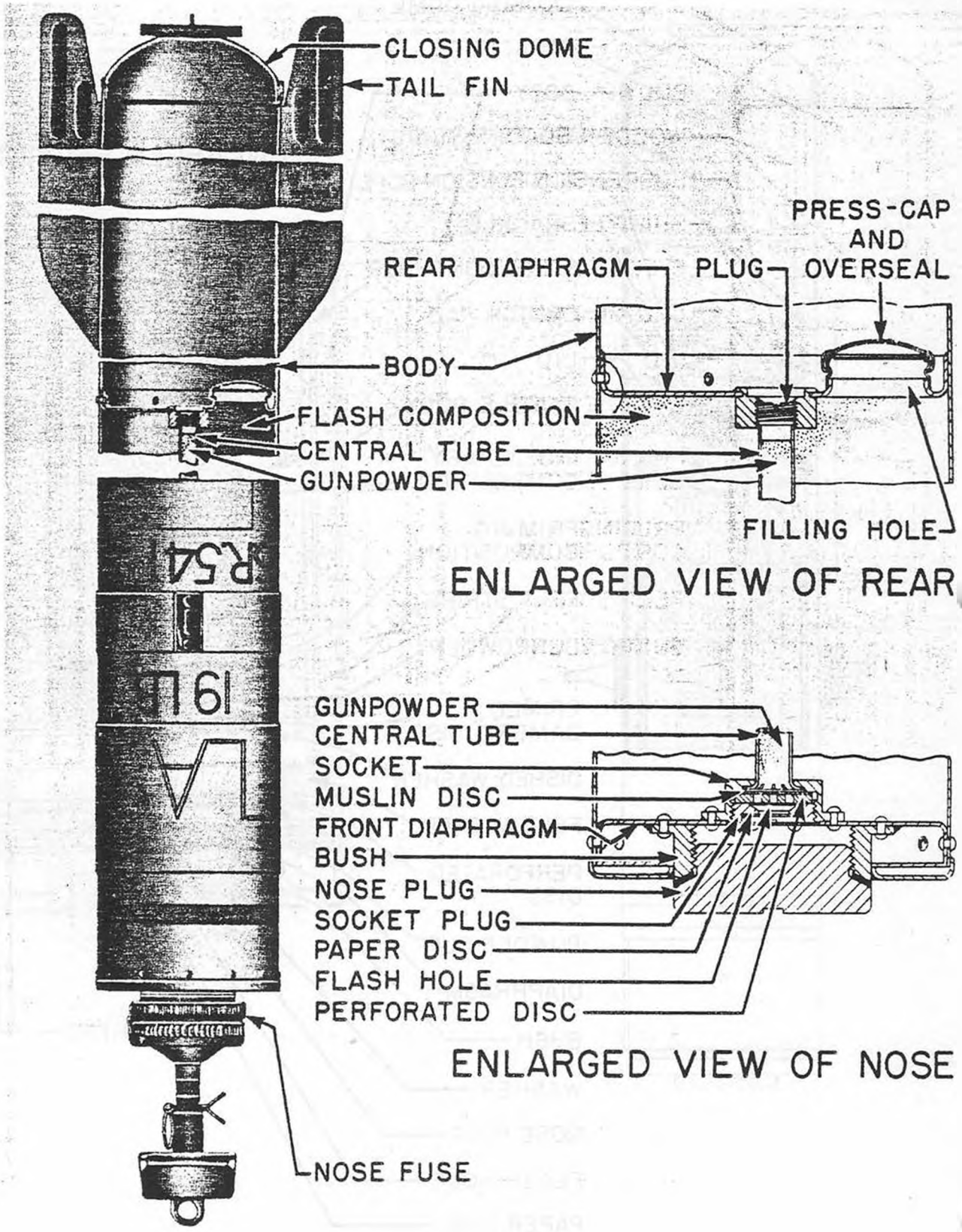


Figure 87—4.5-in. Photoflash Bomb

the flare body by a felt washer, felt strips, and three wooden slats. The slats extend beyond the top of the candle unit and the closing dome, and, when the flare is activated, push off the closing dome to permit the candle unit and parachute to move out of the flare body. A shackle attached to the lid connects the candle unit to the suspension rope of the parachute.

Functioning: When the fuzed flare is released from the aircraft, the fuze is set in operation, and the flare falls freely until the magazine charge explodes. The flash from the charge passes through the flash hole in the diaphragm and ignites the powder puff. The gases formed by the burning of the gunpowder in the puff exert pressure on the under side of the perforated disc, forcing the candle unit toward the closing dome so that the wooden slats push off the dome. The candle unit and parachute are ejected from the flare body.

The flash from the puff passes through the holes in the perforated disc to ignite the primed cambric disc and the gunpowder at the nose of the candle. The gunpowder ignites the priming composition, which in turn ignites the incendiary composition. As the incendiary composition burns, the magnesium alloy candle body also burns, and pieces of the burning candle fall away, giving the appearance of a vertical chain of white lights in the sky.

Suspension: A suspension band with two removable suspension lugs is secured to the flare body. The lugs are secured to the suspension band by screws having a locking wire passing through their heads. A crutch pad is also secured to the flare body.

Remarks: These flares are similar in external appearance to the 4.5 in. Reconnaissance Flare Mk IV.

The Flare Mk II is similar to the Mk I, except that, just below its lid, the candle unit is provided with a container filled with gunpowder. This gunpowder is ignited by the incendiary composition and ejects any magnesium alloy which remains in the candle unit when the incendiary composition is expended. This insures that odd pieces of burning magnesium alloy do not continue to fall after the flare has served its purpose. The Flare Mk III is identical to the Mk II, except that the burning time has been increased to 120 sec. by use of a different type of incendiary composition, and of a steel container and magnesium alloy candle body which are 3 in. longer than those in the Flare Mk II. The increased length of the candle unit is accommodated by reducing the space occupied by the parachute.

4.5-in. Photoflash Bomb Mks I and II, and 4.5-in. Heavy Photoflash Bomb (Service)

Data

Fuzing.....Nose Fuze No. 28B, 848, or 849; No. 860 can be used only if specially authorized
Color markings.....Body black over-all; tail red; ½-in. red band around nose end; FLASH printed plainly on the body near the nose end
Over-all length .....33 in.
Body diameter .....4.5 in.
Total weight .....19 lb.
Illumination time.....0.1 sec. (approx.)

Description: The Photoflash Bombs Mk I and Mk II are similarly constructed, the only difference being that the Mk II has narrower tail fins. Each flash has a tubular body, closed at the tail by a closing dome and at the nose by a front diaphragm having a bush into which is screwed the nose fuze. The four tail fins are located at the after end. A quantity of flash composition is contained in the body between a front and rear diaphragm. The filling hole is closed by a press-cap and overseal. A central tube, closed at each end, extends between the front and rear diaphragms and is filled with gunpowder. A socket secured to the front diaphragm houses a perforated disc, and a muslin disc, which closes the nose end of the central tube. The perforated disc is held in position by a socket plug having a flash hole covered by a disc, which, in earlier issues, is made of brass, but in later issues is paper.

Functioning: When the fuzed bomb is released from an aircraft, its fuze is set in operation and the flash falls until the magazine charge of the fuze explodes. The flash from the magazine charge passes through the perforated disc and ignites the gunpowder in the central tube. The

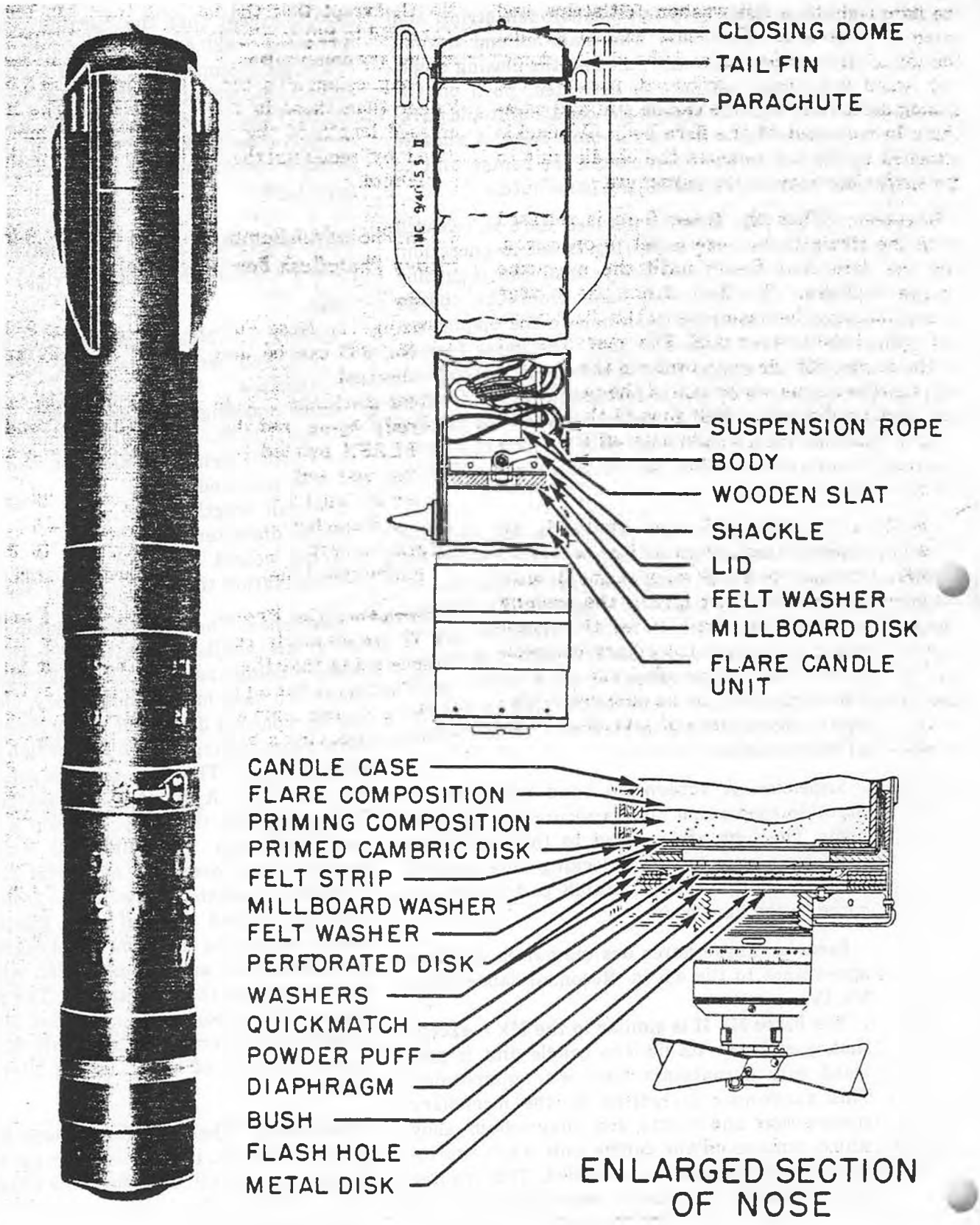


Figure 88—5.5-in. Reconnaissance Flare Mk II

gunpowder explodes, bursts the body of the photographic flash, and simultaneously ignites the flash composition.

Suspension: The bomb is suspended by means of a suspension band to which are secured two suspension lugs, one for attaching to a Light Series bomb carrier, and the other for attaching to a Universal bomb carrier.

Remarks: These flash bombs are intended to provide illumination for night photography, and when activated they explode with a loud report and a vivid white flash. It is important to distinguish between flares and photoflash bombs. They may be distinguished by the following characteristics. FLASH is stencilled on the nose of all photoflash bombs, and the tail of the bomb is red. Eight rivets are visible around the body at the junction of the red and black parts of the bomb. On removal of the tail dome of a flash bomb, there is no parachute or shackle visible.

Externally, the 4.5-in. Heavy Photoflash Bomb is the same as the ordinary 4.5-in. photoflash. Internally, the construction is slightly modified, as the rear diaphragm is moved to a position nearer the closing dome, consequently increasing the length of the central tube. A retaining diaphragm is positioned in the body 5½ in. from the front diaphragm. A cast-iron weight is located between the front and retaining diaphragms, the flash composition being housed between the rear and retaining diaphragms. The fuze is a U. S. Mechanical Time Fuze M III, which has a fuze adapter in order to fit it into the British bomb. When it is loaded, the arming wire is fitted through the second hole in the arming pin and passes through the arming vane lock. The delay may be from 5 seconds to 93 seconds. The heavy bomb weighs 40 lb.

5.5-in. Reconnaissance Flare Mks I and II (Obsolescent)

Data

Fuzing .....Nose Fuze No. 28B, 42, or 848; may use No. 35 or 849; No. 860 can be used only if specially authorized
Color markings....Black over-all with ½-in. red band 5 in. from the nose
Over-all length .....48 in.
Body diameter .....5.5 in.
Parachute diameter .....18 ft.
Total weight .....41.5 lb.
Burning time .....3¼—4¼ minutes
Candlepower .....1,000,000 (approx.)

Description: The Flare Mk II has a tubular body, which contains the flare-candle unit and its parachute. The body is closed at its nose end by a diaphragm having a bush into which is screwed a nose fuze.

The tail end of the body is closed by a closing dome and has four tail fins. The diaphragm has a flash hole, sealed by a thin metal disc. A powder puff, consisting of a primed fabric bag containing gunpowder and strands of quickmatch, is located in position by washers, and a perforated disc to which it is secured. The candle unit comprises a candle case containing the flare composition and a quantity of priming composition. The nose end of the case is closed by a primed cambric disc and a millboard washer, and the tail end is closed by a lid. A shackle attached to the lid connects the candle unit with the suspension rope of the parachute.

Functioning: When the fuzed flare is released from a plane, the fuze is set in operation and the flare falls freely until the magazine charge of the fuze is fired and perforates the metal disc covering the flash hole in the diaphragm. The flash from the magazine charge passes through the flash hole and ignites the primed fabric of the powder puff and the strands of quickmatch, which in turn ignites the gunpowder in the powder puff. The gases formed by the burning of the gunpowder in the puff force the candle unit towards the closing dome, and the wooden slats push off the closing dome and permit the candle unit and parachute to be ejected from the flare body. The parachute then opens and supports the candle unit. Before ejection, the candle is ignited by the flash from the gunpowder in the powder puff; this flash being conveyed by the primed cambric disc at the nose end of the candle case to the priming composition, which, in turn, ignites the flare composition.

Suspension: A suspension band with lug is provided for attachment to a Universal bomb carrier.

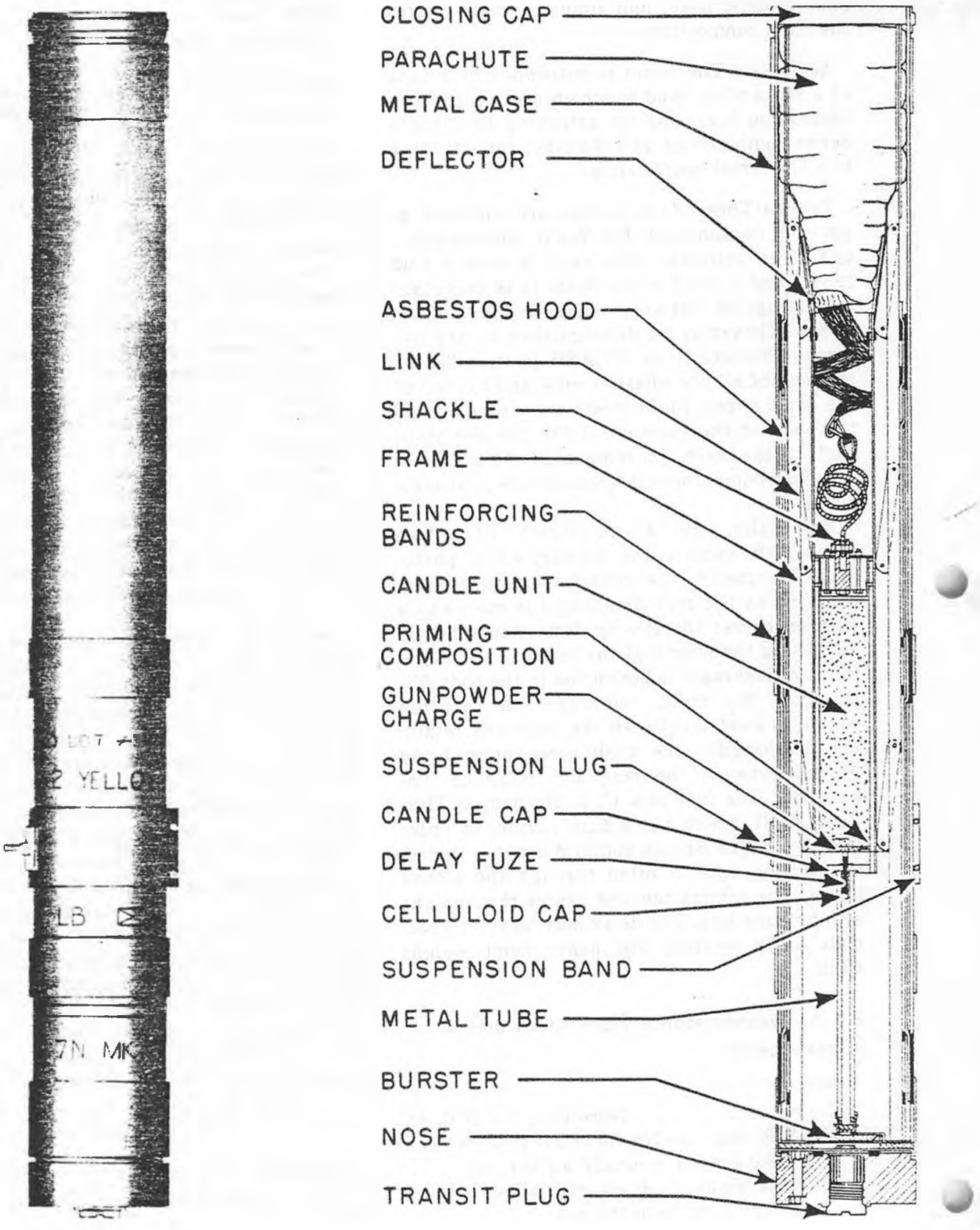


Figure 89—7-in. Hooded Reconnaissance Flare No. 1 Mk I

Remarks: The 5.5-in. Reconnaissance Flare Mk I is similar to the Flare Mk II, except that the duration of burning is approximately 3.5 minutes, and a Parachute Mk I, which is not as strong, is used instead of a Mk II.

7-in. Hooded Reconnaissance Flare No. 1 Mk I, No. 2 Mk I, No. 3 Mk I, and No. 4 Mk I (Service)

Data

Fuzing .....No. 1, Nose Fuze No. 848; No. 2, 3, and 4, Initiator No. C.5 Mk I
Color markings ....Black over-all with ½-in. red band near nose
Over-all length .....No. 1, 63 in.; No. 2, 3, and 4, 60 in.
Body diameter .....7 in.
Total weight .....85 lbs. (approx.)
Burning time .....3 to 4 minutes
Candlepower 750,000

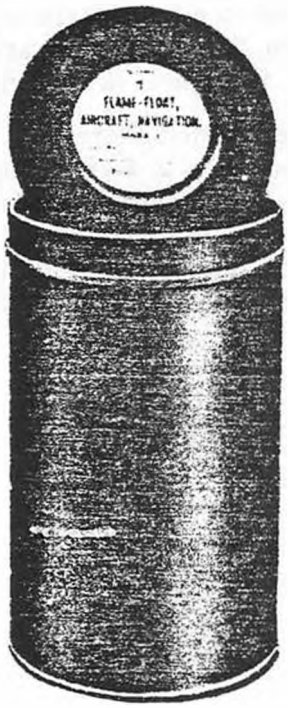
Description: The Flare No. 1 consists of a flare-candle unit contained in a thin metal case, which is fitted with a heavy nose, and closed at the tail end by a metal closing cap. Housed in the rear of the casing is the parachute attached by the shackle to the candle unit. A metal tube containing a primed cambric tube connects the powder puff in the nose of the flare with the candle cap. A length of safety fuse, sealed at each end with a celluloid cap containing a small gunpowder charge, passes through the candle cap to the gunpowder charge contained in the nose of the candle. Attached to the side of the candle unit is a frame to which is fixed the sheet asbestos hood which directs the light downward and shields the eyes of the bombardier from the glare. The form, which folds around the candle unit, has a square cross section when open and extends beyond the ends of the candle unit. The tail end of the hood is partially closed by a deflector.

In the Flare No. 2, the heavy nose and the suspension band are omitted, thereby reducing the weight. The Flare No. 3 is the same as the No. 1 except that it incorporates a 2½-min. delay; and the Flare No. 4 is also the same as the No. 1 except that it has three 14-ft. parachutes.

Functioning: On release from the aircraft, the flare falls in a normal manner until the fuze functions. The flash from the fuze magazine forces the parachute and candle unit out of the metal case, at the same time igniting the primed cambric. The primed cambric ignites the celluloid cap of the safety fuse, and after a short delay the safety fuse fires the gunpowder charge in the nose of the candle. The explosion of the gunpowder forces off the candle cap, at the same time igniting the flare composition. The short delay in the fuse allows the parachute and hood to open before the flare functions.

Suspension: The Flare No. 1 is carried singly by a suspension lug on a band fastened around the body. Flares No. 2, 3, and 4 are carried in Cluster No. 3 Mk I, four flares in each cluster.

Remarks: The Hooded Flares No. 2, 3, and 4 are each fuzed with a 5-sec. Delay Initiator No. C.5 Mk I. These initiators are ignited by the functioning of the cluster fuze to give simultaneous and individual initiation to each flare after the cluster has disintegrated.



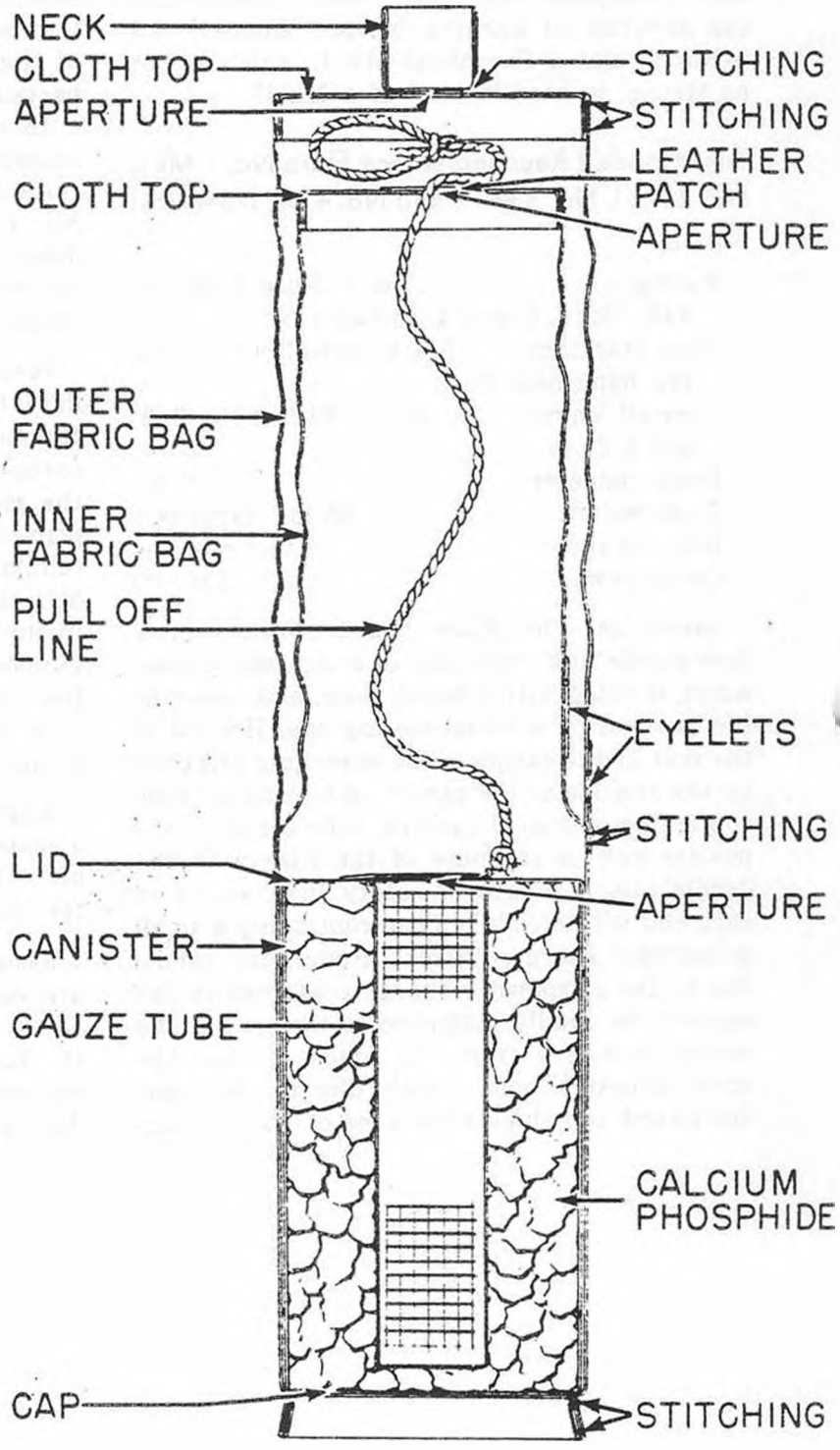


Figure 90—Navigation Flame Float Mk I

Part I—Chapter 20

AIRCRAFT PYROTECHNICS

Introduction

This chapter includes data on flame floats, marine markers, smoke floats, sea markers, and smoke generators dropped from aircraft.

Flame floats and marine markers are devices designed to give off a flame to illuminate surrounding areas of water. Generally calcium phosphide is used as the filler for flame floats. When moistened, this chemical gives off phosphine, a gas spontaneously inflammable on contact with air.

Smoke floats generate smoke by the combustion of a smoke-composition filler. The smoke so produced may be used for indicating a position, for obscurement, or for signalling. Although all smoke floats are designed primarily for use at sea, they differ from each other in construction and design according to the purpose for which the smoke is intended. There are three essential types of smoke floats in use, one for each of the following purposes: to mark a position at sea for navigational or bombing purposes; to create a smoke screen; and to be thrown by hand from a plane or dinghy to attract attention following a forced landing.

Sea markers are designed to be dropped at sea to produce a distinctive surface patch on the water readily visible from the air in daylight for purposes of navigation or identification. Generally, aluminum powder with stearic acid is used as the filling to form a slick.

Smoke generators are designed to emit smoke, sometimes colored, upon ignition of their filling. Only one type of generator is discussed, since it is the only one intended to be dropped from aircraft in flight.

Navigation Flame Float Mk I (Obsolescent)

Data

Fuzing .....None; water initiated
Color markings .....Cylinder painted red with yellow label on lid
Over-all length .....Extended, 17 in.; collapsed, 8 in.
Body diameter .....3.7 in.
Filling .....Calcium phosphide
Filler weight .....2 lb.
Total weight .....3.2 lb.
Burning time .....5 min.

Description: The float consists of a cylindrical tin-plate canister with a tin-plate lid, having a central aperture, soldered over the top of the canister, and a slotted brass sealing patch soldered over the aperture. Soldered to the lid is an iron gauze tube, which extends axially nearly to the bottom of the canister, and is closed at its lower end. The annuallar space outside the gauze tube is filled with granular calcium phosphide. At its base the canister is closed by a cap, which fits over its outside. The canister is surrounded by an outer fabric bag, which is considerably longer than the canister. Secured by a double row of stitching inside the outer fabric bag and above the canister, is a second fabric bag, termed the inner fabric bag. Two eyelets are located above the top of the canister in the walls of the inner and outer fabric bags at different levels. The pull-off line passes through the aperture in the leather patch at the top of the inner fabric bag and through the neck of the outer fabric bag. The aperture has a fairly snug fit on the line.

Functioning: When the flame float has been prepared for use by removing the brass sealing patch and has been dropped into the sea, water enters the canister through the aperture in its lid and passes through the eyelets. The water enters the gauze tube, through which it penetrates into the calcium phosphide filling. Phosphine is then evolved, inflating the inner fabric bag, and providing sufficient buoyancy to bring the flame float to the surface of the sea. The gas escapes from the neck of the outer fabric bag, and takes fire spontaneously on contact with the air, producing a highly luminous flame.

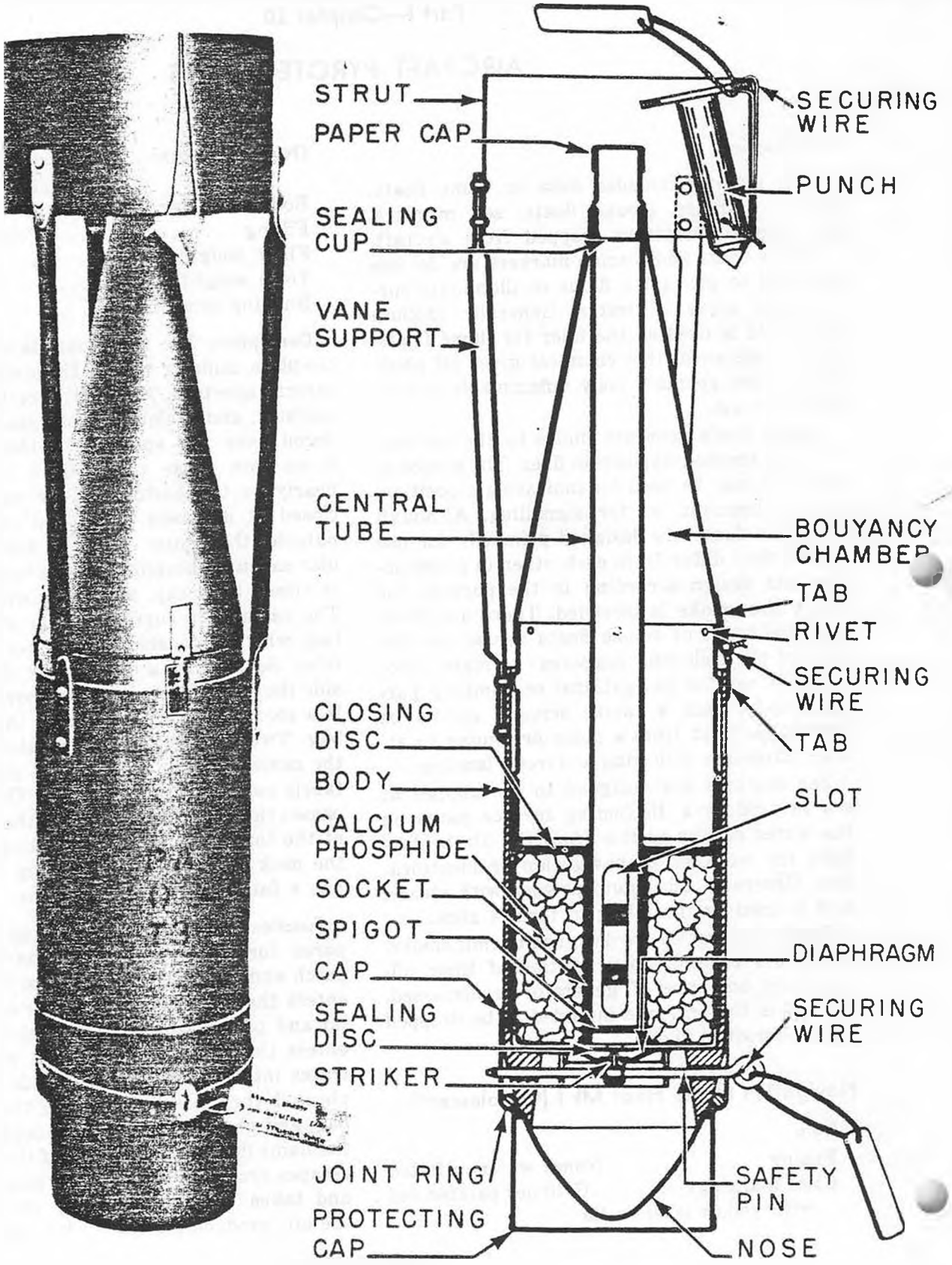


Figure 91—Navigation Flame Float Mk II

Remarks: The flare may be dropped from any height and gives a reasonably steady and bright flame for about five minutes. A flame continues for an additional 15 minutes, but it becomes increasingly feeble and intermittent. If the sealing patch of the canister has been removed, the flame float must be dropped or removed to a safe place for disposal.

Navigation Flame Float Mk II, and No. 4 Mk I, and Message Carrying Flame Float Mk I (Service)

Data

Fuzing .....Integral striker mechanism
Color markings .....Body, strut supports, strut, and protecting cap painted red; tail cone painted yellow
Over-all length .....23.4 in.
Body diameter ....5.9 in.
Filling .....Calcium phosphide
Filler weight .....1.8 lb.
Total weight .....11.8 lb.
Effective illumination .....6 min.

Description: The Flame Float Mk II consists of two main parts, a body and a container. The body is a cylindrical casting, to one end of which three strut supports are riveted. A cylindrical strut is riveted to the supports. Secured to the fin by a securing wire is a punch to which is attached an instruction tag. The body is thickened at the nose end, and has an attached conical nose of thin sheet steel. A protecting cap is fitted over the nose, and a safety pin passes through holes in both the cap and nose.

The container consists of a sheet-metal cylinder, to one end of which is attached a sheet-metal tail cone. The opposite end of the container is closed by a cap. The cap is apertured and carries a correspondingly apertured spigot and a wire gauze socket on the side facing the tail cone. Passing axially along the container is a central tube, one end of which is soldered to the narrow end of the tail cone, while the other end fits into the socket. Near the tail end, the tube is closed by a sealing cup, projecting from which is a punch sleeve closed by a paper cap. On the side opposite the spigot the cap carries a diaphragm, which retains a striker. The striker is bored to receive the safety pin.

The lower part of the container is filled with granular calcium phosphide, which is held in position by a closing disc. This material surrounds the slotted portion of the central tube. Beyond the closing disc the annular space between the container and the central tube forms a sealed buoyancy chamber.

Functioning: Before the float is dropped, the punch is removed from the strut by cutting the securing wire, and the sealing cup on the punch sleeve is punctured with it. After the sealing cup has been broken, the flame float must be dropped from the aircraft immediately.

On dropping from an aircraft, impact with the water crushes the nose of the float and causes the striker to penetrate the sealing disc. At the same time the securing wires holding the container to the body are broken, and the container and tail cone are forced away from the body. The buoyancy chamber maintains the tail cone uppermost in the water. Water enters the aperture in the cap, and passes through the gauze socket and the slots in the central tube into the calcium phosphide. The phosphine generated on entry of the water passes upwards through the central tube, from which it emerges through the hole pierced by the punch through the sealing cup, and, on contact with the air, takes fire spontaneously.

Remarks: The inner body of the Navigation Flame Float No. 4 Mk I is identical to the inner body of the Float Mk II.

The Message Carrying Flame Float Mk I is almost identical to the Navigation Flame Float Mk II in dimensions and construction. The essential difference is that a message container is suspended in the buoyancy chamber by a fixing wire secured to a plug, which is screwed into a bush in the tail cone. The plug is provided with a handle to facilitate its removal from the bush, and a washer on the plug insures a water-tight joint. An arrow and the words MESSAGE HERE are painted on the tail cone to direct attention to the message.

Navigation Flame Float No. 3 Mk I (Obsolescent) and No. 3 Mk II (Service)

Data

Fuzing .....None; water initiated

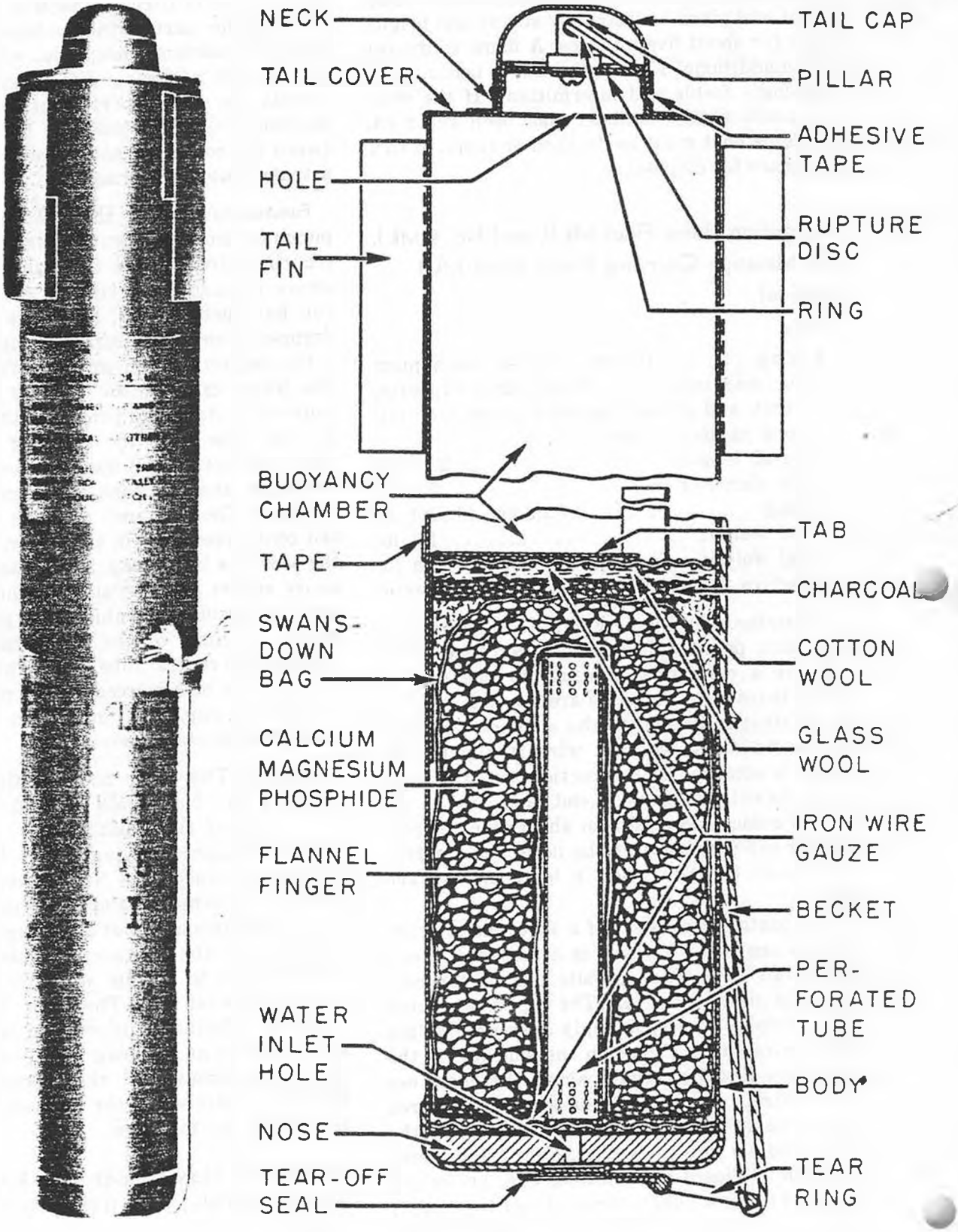


Figure 92—Navigation Flame Float No. 3 Mk I

Color markings .....Yellow over-all
Over-all length .....18.5 in.
Body diameter .....2.9 in.
Total weight .....2.5 lb.
Filling .....Calcium magnesium phosphide
Effective illumination .....5 min.

Description: The Flame Float No. 3 Mk I has a cylindrical tinplate body, the after end of which has four attached tail fins. The tail end of the body is closed by a tail cover having a central hole. The neck of the tail cap is closed by a thin rupture disk to which is secured a small pillar having a ring passing through it. The forward end of the body is closed by a cast-iron nose having a central water-inlet hole. The nose is contained in a tin-plate cover, having a central hole covered by a tear-off seal to which is secured either a ring or an eyelet. Inside the body is a perforated zinc central tube surrounded by a swansdown bag containing calcium magnesium phosphide. Cotton wool is packed around the tail end of the bag, and a layer of glass wool is located between the bag and the iron wire gauze. The charcoal is provided to absorb any slight traces of gas which may be given off while the flame float is in storage. The tail end of the body comprises the buoyancy chamber of the flame float.

Functioning: Before dropping, the tear-off seal at the nose is removed. When dropped, the tail rupture disc is broken and the float rises to the surface. Water enters through the water-inlet hole in the nose, passes through the perforated zinc tube, and soaks through the flannel finger into the swansdown bag, where it reacts with the calcium magnesium phosphide to give off spontaneously inflammable phosphine. The phosphine, so generated, escapes through the broken rupture disc and takes fire on contact with air.

Remarks: Should either of the seals be broken while in storage, the damaged flame float must be removed to a dry place where the possibility of its catching afire is an acceptable risk pending final disposal.

The Float Mk II differs from the Mk I in that a rear seal and tear-off cord are substituted for the tail rupture assembly of the Mk I. The long perforated tube of the Mk I is considerably shortened in the Mk II.

Marine Marker Mk I (Obsolescent)

Data

Fuzing .....None; water initiated
Overall length .....26.8 in.
Body diameter .....5.8 in.
Total weight .....16 lb.
Filling .....Aluminum and magnesium phosphides
Color .....Body and nose red; tail and tail cap yellow
Effective illumination .....2 hours

Description: The marker consists of a light metal body and tail, which are separated by a diaphragm The tail is closed by a metal plate, having a tail cap connected to the main outlet tube. The forward end of the body is closed by a heavy metal plate into which are set two water-inlet valves. A tube passes from the central valve, through the filling and spring-loaded pressure plate, and amost to the diaphragm. The pilot tube extends aft from the off-center valve to the pressure plate. The pilot outlet tube then continues to a strainer attached to the diaphragm from which the main outlet tube issues. The pressure plate retains the main filling in the forward part of the body.

Functioning: When the marker has been prepared for use and dropped into water, the water jacket fills and the scallopped disc in the main valve and the large disc in the pilot valve are forced against the ledges in the valves, thus preventing too great an ingress of water while it is submerged. Some water, however, enters the main outlet tube, passes through the pressure plate, and reacts with the calcium phosphide. This reaction evolves impure phosphine gas, which ignites spontaneously when the marker surfaces. As it surfaces, the pressure against the valves is relaxed, and the springs return the discs against the circlips, thus permitting the ingress of water through the scallops in the disc to the bottom of the inlet tube and pilot tube. The water entering the main valve passes through the inlet tube into the perforated tube, and after passing through the perforated diaphragm percolates through the flannel sheath and reacts with the main charge to give off pure phosphine, which is not spontaneously inflammable. The cap over the free

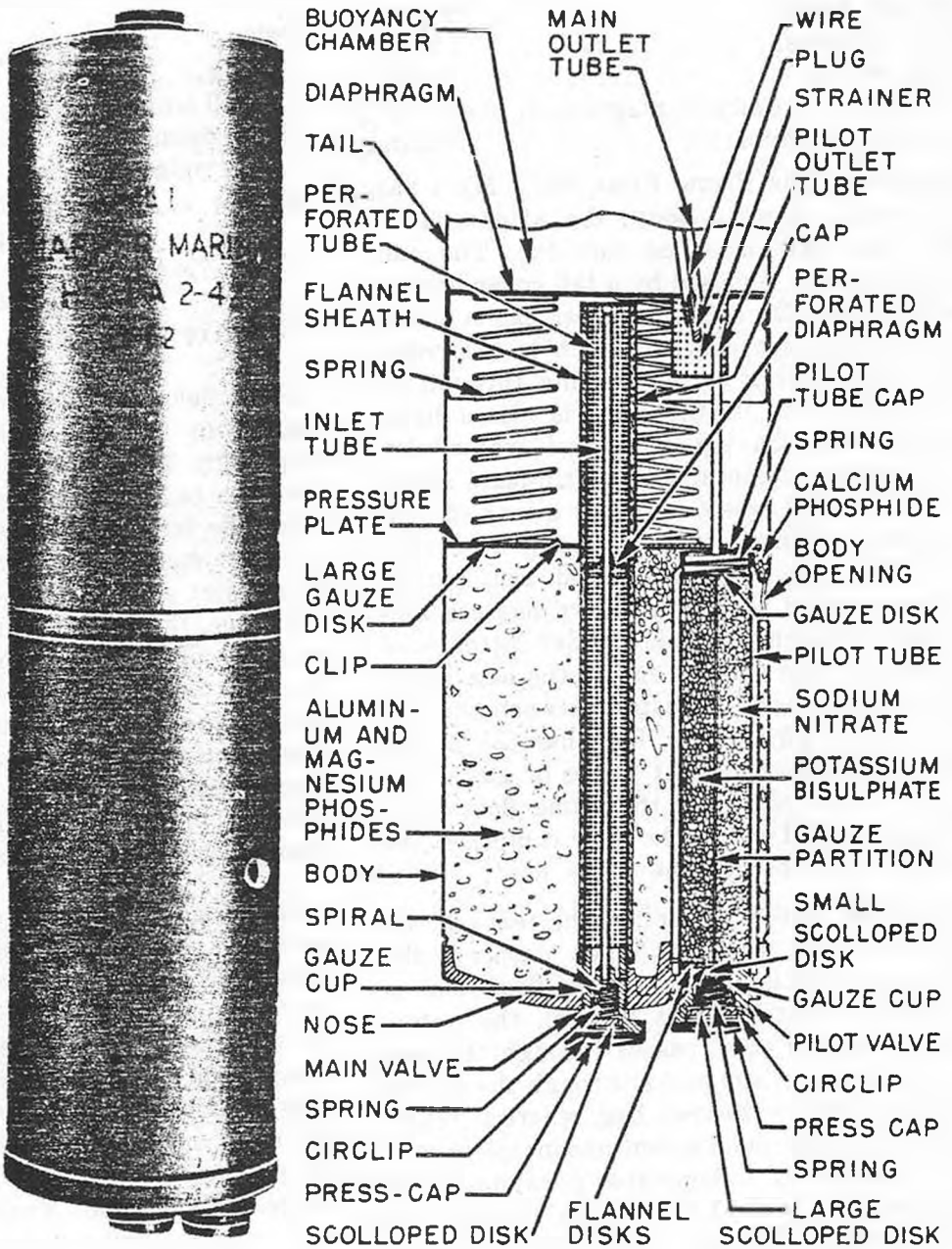


Figure 93—Marine Marker Mk I

end of the perforated tube prevents the water from percolating through the part of the flannel sheath above the pressure plate.

The water entering the pilot valve percolates through the flannel disc and dissolves the potassium bisulphate and the sodium nitrite. The chemicals interact and evolve gaseous oxides of nitrogen which mix with the phosphine in the strainer. The mixed gases are spontaneously inflammable in air, and, passing through the main outlet tube, ignite immediately on reaching the air. The flame thus produced continues to burn evenly for approximately two hours, during the whole of which time the gases remain spontaneously inflammable, so that even if the flame is put out by a wave, it lights again as soon as contact with air is re-established.

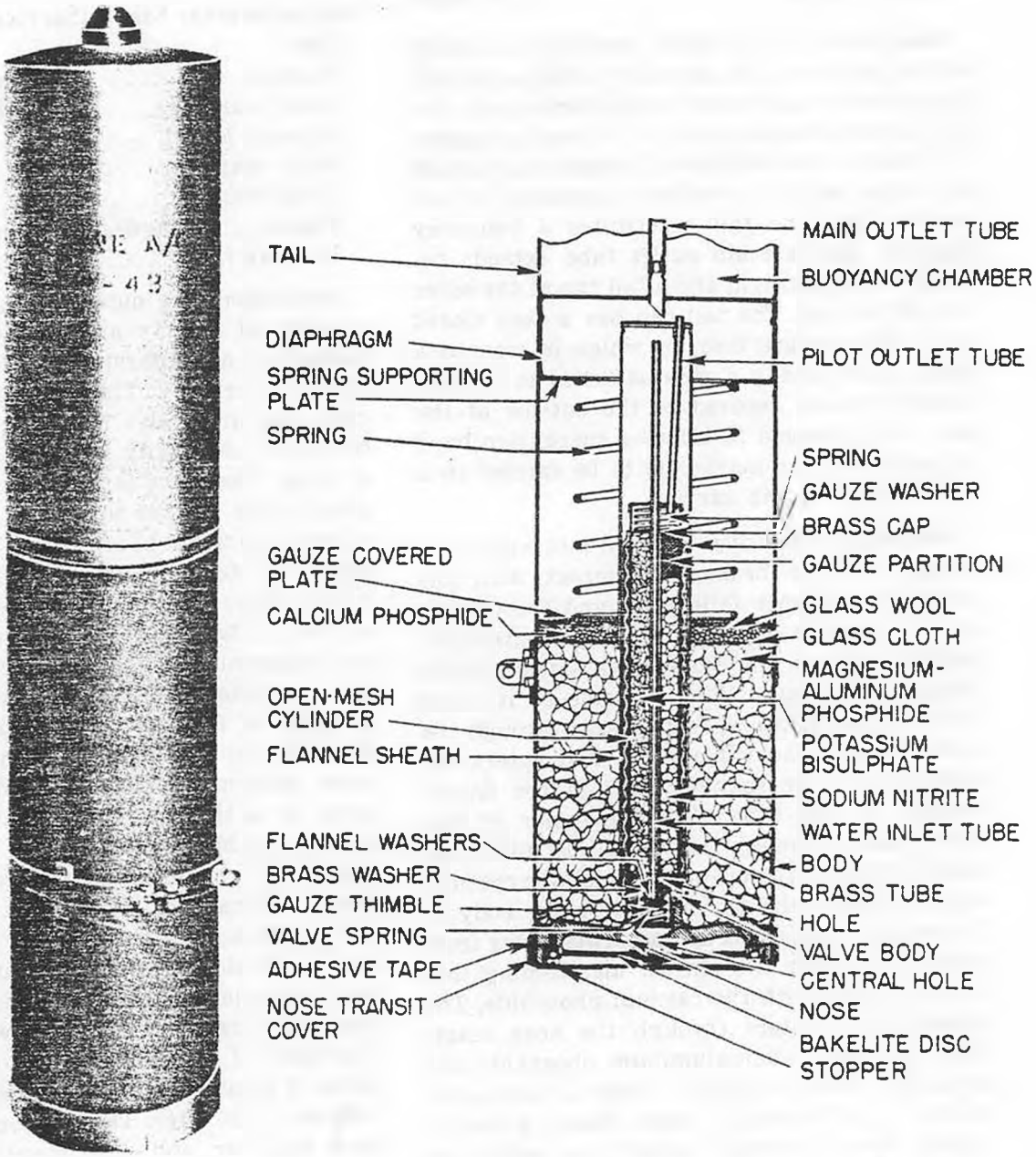


Figure 94—Marine Marker Mk II

Remarks: The flame is visible in daylight over a distance of at least three miles, and at night over a distance of about 20 miles. White smoke is given off with the flame. In damp atmosphere, after removal of the over-seals and press-caps, this marker evolves spontaneously inflammable phosphine, and for this reason should be prepared for use only just before it is to be launched.

Marine Marker Mk II (Service)

Data

Fuzing .....None; water initiated
Color markings .....Body and nose transit cover painted red; tail, tail cap, and tail transit cap painted yellow
Over-all length .....30 in.
Body diameter .....5.8 in.

Total weight .....19 lb.
Filling ....Magnesium-aluminum phosphide
Burning time .....2 hours

Description: This marker consists of a body with a steel nose at one end, having a central hole closed by a stopper which forms part of a thin bakelite disc secured to the nose by screws. The disc is protected during transit and storage by a nose transit cover held in position by adhesive tape. The tail constitutes a buoyancy chamber, and a main outlet tube extends between the diaphragm and a tail cap at the outer end of the tail. The tail cap has a neck closed by a thin rupture disc, to which is secured a small pillar having a ring attached to it. Two locating pieces, secured to the outside of the body, are provided to locate a suspension band in position if the marker is to be carried on a Light Series Bomb carrier.

Functioning: When it is dropped into water, the bakelite disc is broken by impact with the water; the stopper falls away and the marker rises to float on the surface. Water enters the central hole in the nose, and after passing through the gauze thimble, some of it soaks through the flannel washer, passes through the small hole in the valve body, and enters the brass tube after soaking through the flannel washer in the tube. The remainder of the water passes through the water-inlet tube, percolates through the open-mesh metallic cylinder and its flannel sheath, and enters the body of the marker. The brass cap prevents water from passing through the sheath and coming into direct contact with the calcium phosphide. The water which enters through the nose reacts with the magnesium-aluminum phosphide and gives off pure phosphine, which is not spontaneously inflammable. Some water, however, passes down the main outlet tube while the marker is submerged, and this water reacts with the calcium phosphide to produce a phosphine which, in contact with the air, is spontaneously inflammable. The supply of spontaneously inflammable gas lasts only about three minutes, and the flame is thereafter maintained by the phosphine envolved from the magnesium-aluminum phosphide mixing with the gaseous oxides of nitrogen given off by the interaction of the potassium bisulphate and the sodium nitrite, which are dissolved by some of the water which enters through the nose.

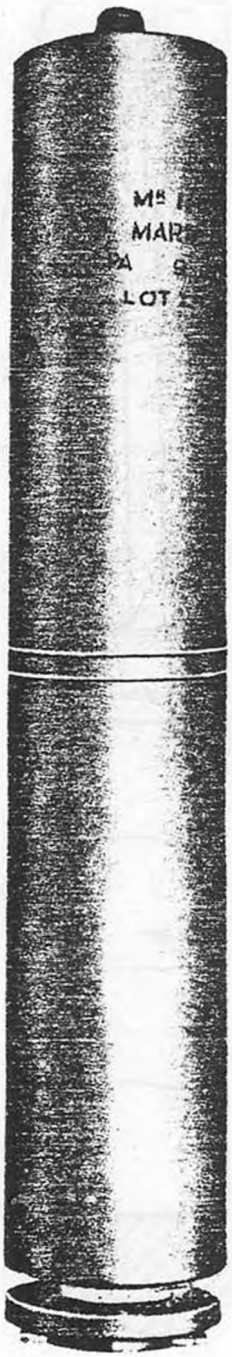
Marine Marker Mk III (Service)

Data

Fuzing .....None; water initiated
Color markings .....Blue grey over-all
Over-all length .....36.8 in.
Body diameter .....6.0 in.
Total weight .....21 lb.
Filling ....Magnesium-aluminum phosphide
Burning time .....2 hours

Description: The outer casing of this marker consists of a body and a tail which are connected by a diaphragm. A heavy nose is secured to the body. The nose has a cavity to receive the time valve, and a central hole at the bottom of the cavity which is closed by a transit plug. The valve is a clockwork device which permits the marker to remain in the water for a period up to six hours before it functions. The period of delay is determined by setting the valve before the marker is released from the aircraft. The main filling consists of magnesium-aluminum phosphide, and is packed round a gauze cylinder. Inside the gauze cylinder is a quantity of fast calcium phosphide, which also extends over the top of the magnesium-aluminum phosphide. The main filling is held in place by a thin steel plate having large holes covered by brass gauze, and a large spring anchored to a spring-supporting plate, which abuts against the diaphragm connecting the tail to the body of the weapon. A layer of charcoal is provided beneath the steel plate to absorb any small quantities of phosphine gas generated by traces of moisture which may be in the body of the marker during filling, and a layer of glass wool beneath the charcoal which acts as a dust filter. The tail constitutes a buoyancy chamber, and a main outlet tube extends between the diaphragm and a tail cap at the outer end of the tail.

Functioning: After entering the water, the marker rises to the surface and floats tail uppermost, water entering the nose cavity through the two small holes in the side of the nose. At the expiration of the delay set on the time valve, the Welvic plug sealing the hole in the side of the time valve is opened and the water passes through the time valve and the central hole at



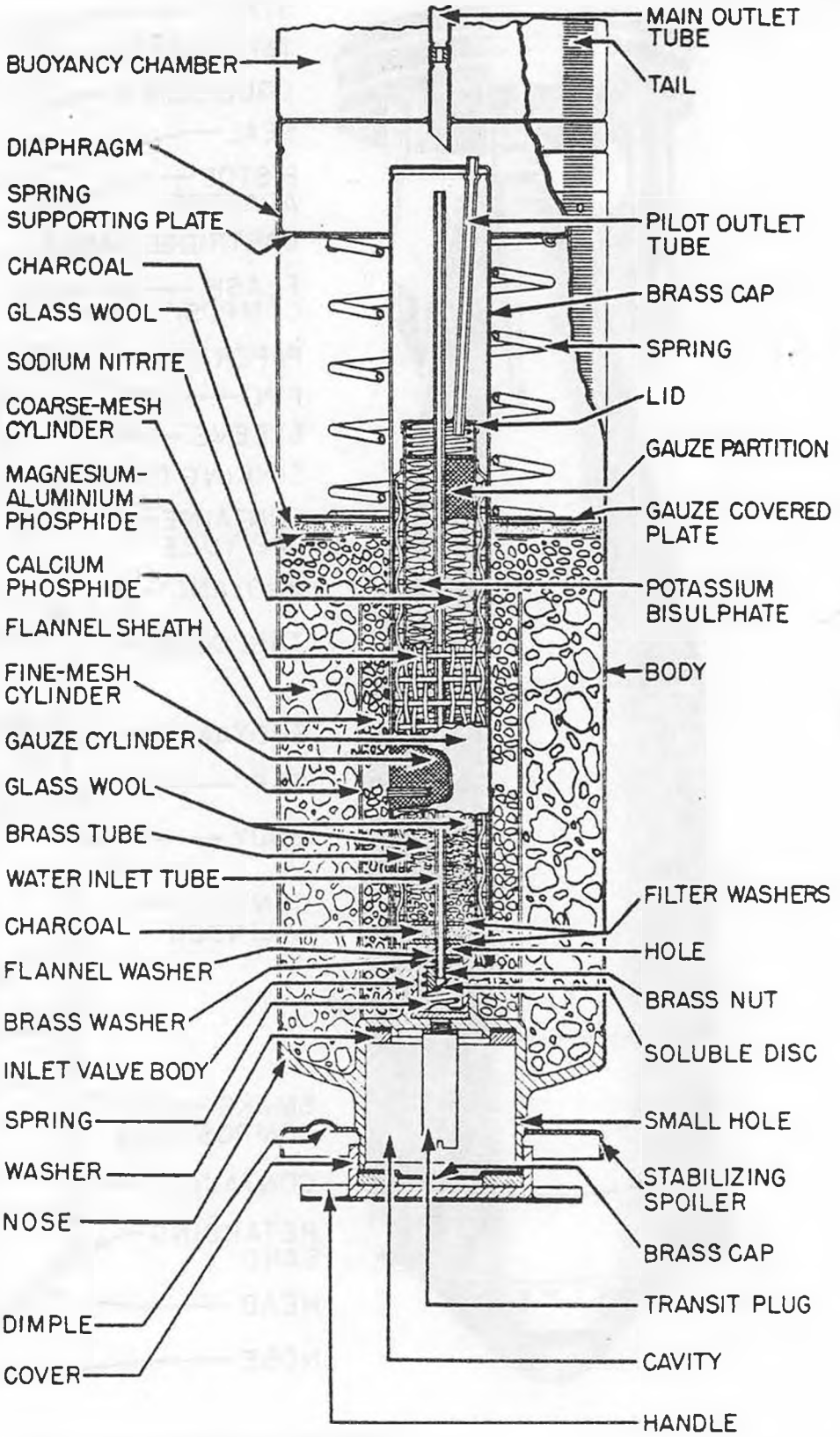


Figure 95—Marine Marker Mk III

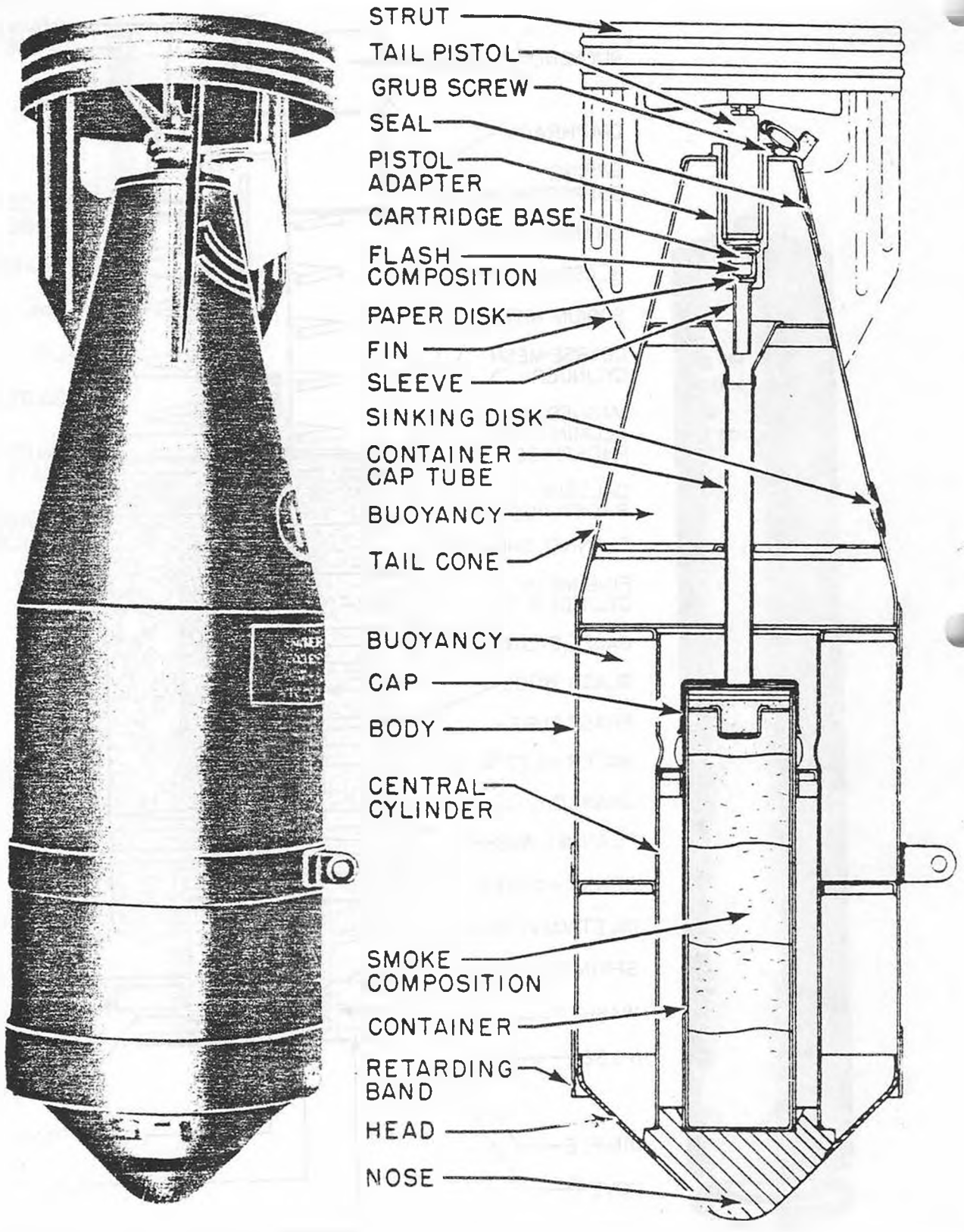


Figure 96—Smoke Float No. 1 Mk IV

the bottom of the nose cavity, into the water inlet valve in the nose. Some of the water entering the water-inlet valve soaks through the flannel washer and passes through the small hole in the inlet valve into the brass tube to react with the filling in the brass tube. The remaining water, after dissolving the soluble disc covering the nut, passes upwards through the water-inlet tube, percolates through the coarse-mesh cylinder, the flannel sheath, and the fine-mesh cylinder, and enters the body of the marker. The brass cap prevents water from passing through that portion of the sheath which is above the fine-mesh cylinder.

The water passing through the fine-mesh cylinder, together with the small quantity which passes down the main outlet tube while the marker is submerged, reacts with the calcium phosphide in the gauze cylinder and covering the top of the main filling, to produce impure phosphine, which, in contact with air, is spontaneously inflammable. This supply of gas lasts only for a few minutes, and is thereafter maintained by the pure phosphine evolved from the magnesium-aluminum phosphide mixing with the gaseous oxides of nitrogen given off by the interaction of the potassium bisulphate and the sodium nitrite, which are dissolved by the water entering the brass tube.

Remarks: When breaking the rupture disc, do not hold the head directly over the tail cap of the marker. This avoids possible injury to the eyes which might be caused should sufficient pressure be built up in the marker to force phosphide dust particles past the glass wool filter at the top of the main filling.

Smoke Float No. 1 Mks II, III, IV, and IVZ (Service)

Data

Fuzing ..... Tail Pistol No. 23
Color markings ..... Body, head, and nose painted green; tail cone vanes and strut painted yellow; red ring ½-in. wide around head near nose
Over-all length ..... 22 in.
Body diameter ..... 6 in.
Total weight ..... 11.5 lb.
Duration of burning ..... 6 min.
Color of smoke ..... white

Description: The Smoke Float No. 1 Mk IV comprises a cylindrical body, closed at one end by a conical head and a heavy nose. A retarding band is secured to the body adjacent to the head. A tail cone, carrying three vanes to support the vane ring, is secured to the opposite end of the body. The end of the tail cone houses a pistol adapter for the tail pistol, which is locked in place by a grub screw. Inserted in the pistol adapter is a cup, containing a cartridge base and a small quantity of flash composition, sealed with a paper disc. A sleeve leads from the bottom of the pistol adapter into the funnel-shaped upper end of the tube, known as the container cap tube. The container for the smoke composition has a fuzible cup inserted into the top of the smoke composition, which is filled with pressed priming composition. Above this is a layer of loose priming composition, and a primed cambric disc through which is threaded a length of quickmatch. The container is closed by a container cap. A central cylinder, provided with a ring of holes, surrounds the container. The rest of the body and the tail cone comprise a buoyancy chamber. The tail cone is provided with a sinking disc, which is scored, so that if a floating smoke float is found, the disc can be easily pierced to sink the float, the water entering the tail cone and passing into the body through the holes in the central cylinder.

Functioning: When the fuzed smoke float has been dropped from the aircraft, impact of the nose on the surface of the water causes the striker of the pistol to hit the cartridge base, and the ensuing flash ignites the flash composition. The flash from the flash composition passes down the container cap tube and ignites the primed cambric disc and quickmatch, which ignite the primings. The fusible cup melts, and the primings ignite the smoke composition. Smoke rises up the container cap tube, and as the pressure increases, bursts the seal of the tail cone. The short period between impact with water and bursting of the seal is sufficient to enable the smoke float, after submerging, to rise to the surface, owing to its buoyancy.

Suspension: A suspension lug provided on the body permits attachment of the smoke float to a Light Series Bomb carrier.

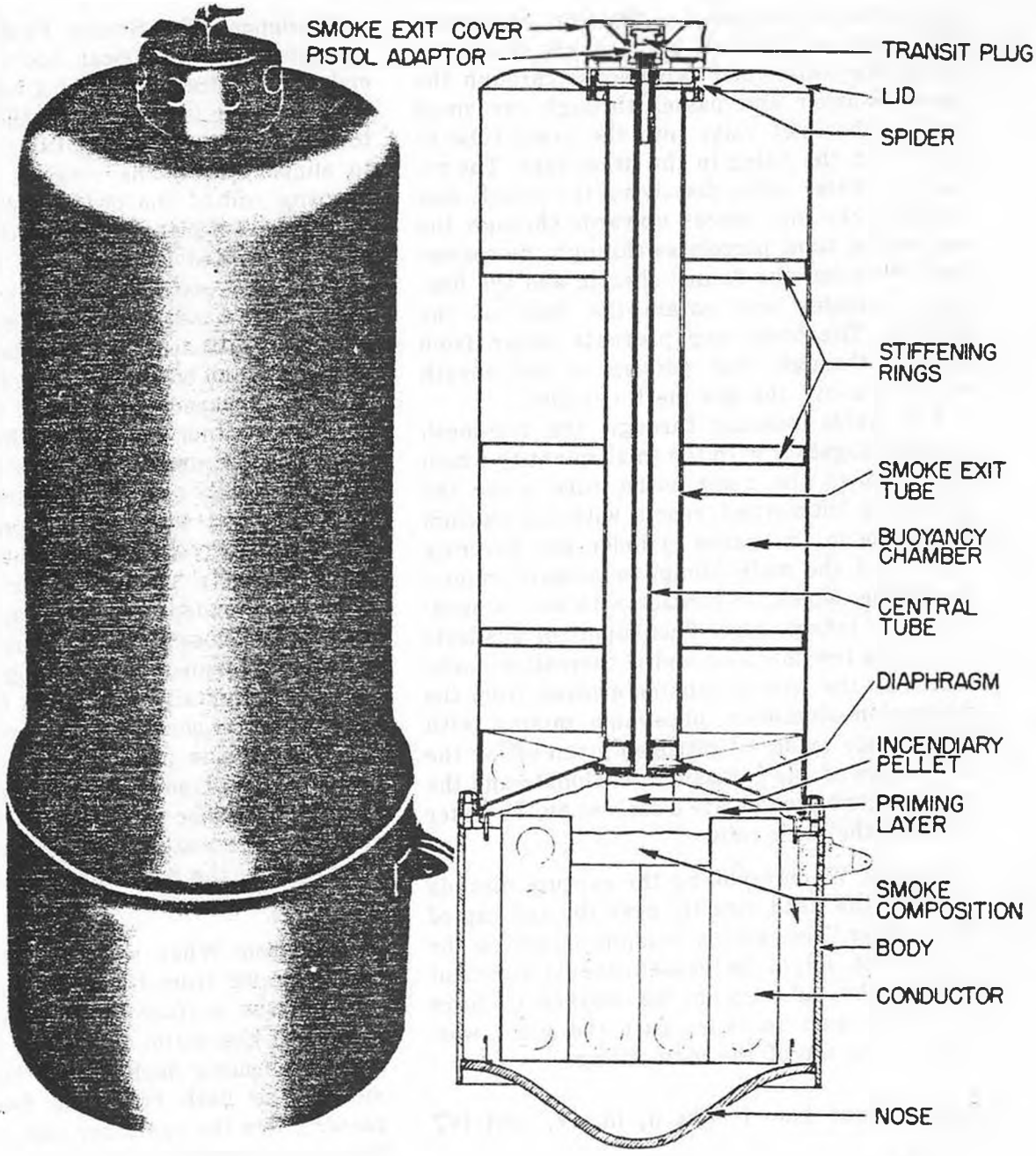


Figure 97—Smoke Float No. 2 Mk II

Remarks: In the Float No. 1 Mk II, the container cap tube serves only to carry smoke from the container to the sealed hole in the tail cone. A length of safety fuse, giving a 20-sec. delay, extends between the pistol adapter and the container. In the Float No. 1 Mk III, the container cap tube also serves only to carry the smoke from the container to the sealed hole in the tail cone. A separate flash tube guides the flash from the flash compositon to the container. The Float No. 1 Mk IVZ differs from the Float Mk IV only in the nature of the smoke composition used.

Should water, especially salt water, come into contact with the smoke composition, it is liable to spontaneous combustion due to chemical action.

Smoke Float No. 2 Mks I and II (Obsolete)

Data

Fuzing .....Tail Pistol No. 48
Color markings .....Green over-all; red band around nose; yellow band around tail
Over-all length .....45.5 in.
Body diameter .....13 in.
Total weight .....108 lb. (empty)
Duration of burning .....8-10 minutes

Description: This float consists of a cylindrical body with a rounded nose containing the smoke composition. The nose piece is riveted to a metal band passing around the body at the joint. The rest of the body is cylindrical and contains a central well filled with primed cambric. At the after end of the central well is the pistol well. The body has several internal stiffening rings.

Functioning: When the fuzed float is dropped, the striker overcomes the creep spring on water impact, and fires a detonator located below the pistol in the pistol well. The flash is carried to the smoke composition in the nose of the float by means of the primed cambric in the central well.

Suspension: The float is suspended by means of a single lug attached near the nose.

Remarks: The Float No. 2 Mk I has its forward end reduced in diameter about 1½ in. for a distance of about one foot.

Smoke Float No. 3 Mk I (Obsolescent)

Data

Fuzing .....Pull-percussion igniter
Color markings .....Upper half of body is yellow; lower half green, with red band ½ in. wide 2 in. from bottom
Over-all length .....10.1 in.
Body diameter .....6.7 in. by 4.95 in. (rectangular)
Duration of burning .....40 sec.
Color of smoke .....Red

Description: The float consists of a thin metal body at the upper end of which six smoke-emission holes, covered by a fabric seal, are located. A wire gauze washer, held in place by an upper and lower liner, divides the body into two portions, the upper portion comprising a buoyancy chamber, and the lower portion housing a number of large and small smoke pellets disposed around a pull-percussion igniter. The large smoke pellets are arranged in tiers. The pellets in the upper tier are each contained in a primed cambric cylinder. Below the wire gauze washer, a primed cambric washer rests on the upper ends of the primed pellets, and strips of primed cambric cross over the igniter. The igniter, which is secured to the body, includes a split-headed clutch which is movable lengthwise in the igniter body. A whipcord becket is secured to the head of the clutch and threaded through a rubber disc. The upper end of the clutch is sprung over one end of a striker, which is spring-loaded when the clutch is pulled out. Opposite the free end of the striker is a percussion cap, and an anvil housed in an ignited plug screwed into the igniter body. A length of safety fuse, enclosed in a tube, terminates in a capsule filled with igniter composition.

When the float is to be used, proceed as follows: Remove the adhesive tapes securing the covers and remove both covers. Press in the center of the press-cap to release the cap, and then remove the cap. Pull the whipcord becket and the clutch out of the float, and immediately throw tne smoke float overboard to leeward.

Functioning: When the clutch is pulled out, the striker is released and fires the percussion cap. The flash from the cap ignites the safety fuse, which fires the igniter compositon in the capsule after a delay of not less than eight seconds. The flash from the igniter composition is conveyed by the primed cambric strips and the primed cambric washer to the pellets in the upper tier. The smoke produced raises the pressure in the buoyancy chamber until the pressure bursts the fabric seal, and the smoke escapes to the atmosphere through the smoke-emission holes.

Remarks: This smoke float is intended for use from an emergency dinghy after a forced landing has been made, to assist search planes.

Aluminum Sea Marker Mk I (Service)

Data

Fuzing .....None; impact initiated

Color markings .....Aluminum over-all
Length .....4.5 in.
Width .....3.5 in. (square)
Weight .....1 lb.

Description: The marker consists of a fragile, paper-sided body of square cross section, fitted with wooden end pieces, and filled with aluminum powder. The outside is coated with aluminum paint. The body is surrounded by a loose cardboard sheath to protect it from damage while being handled.

Functioning: When the sea marker is dropped from a plane, the cardboard sheath separates from the marker, and the latter ruptures on impact with the sea, leaving a patch of aluminum powder floating on the surface.

Remarks: This marker contains no explosives.

Aluminum Sea Marker Mk III (Service)

Data

Fuzing .....Simple impact striker
Color markings .....Aluminum over-all

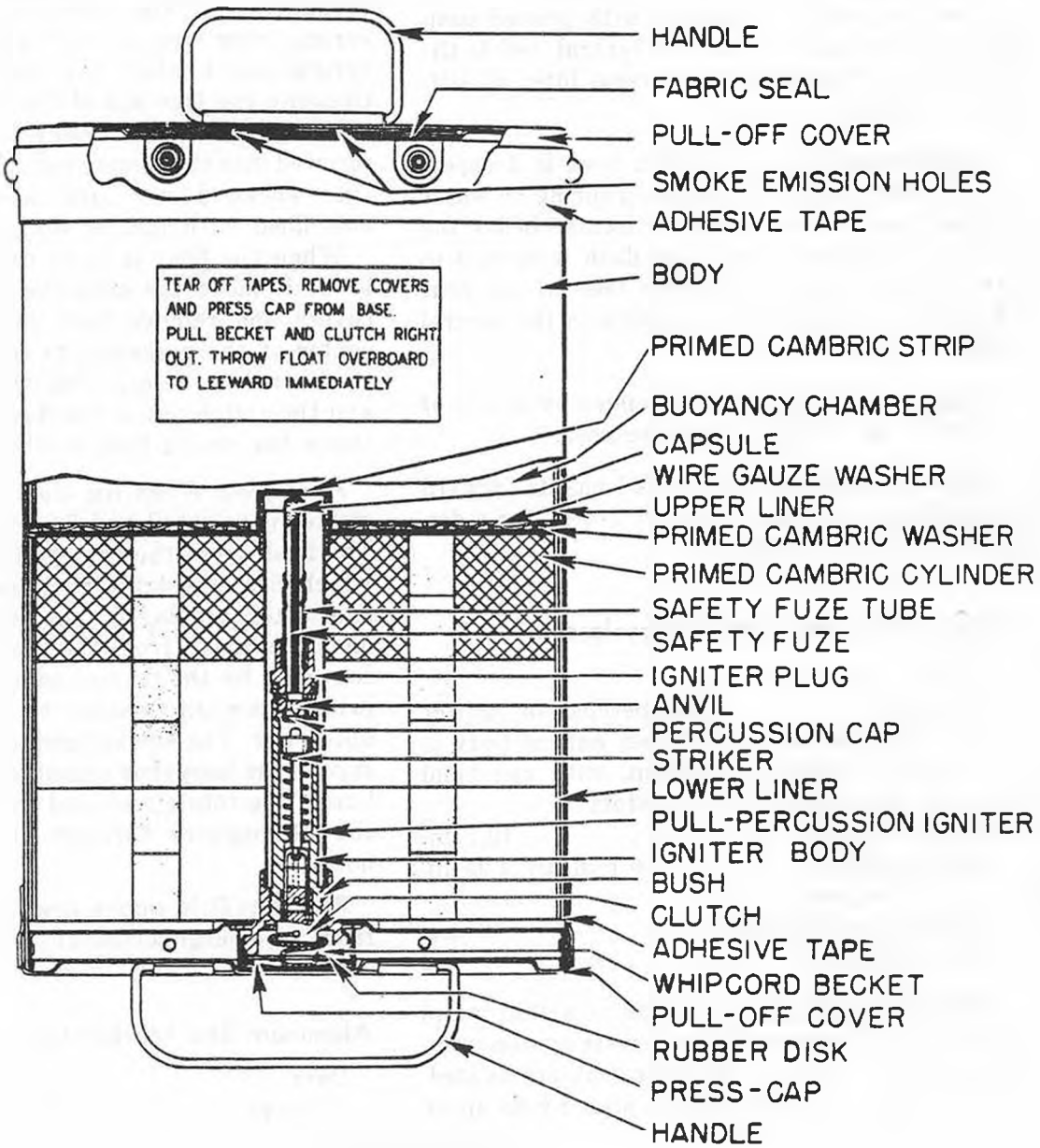


Figure 98—Smoke Float No. 3 Mk I

Over-all length .....23.12 in.
Body diameter .....4.4 in.
Total weight .....10.25 lb.

Description: The sea marker consists of a cylindrical tin-plate body and tail cone containing aluminum powder, and a detonator-burster charge, which explodes when the marker is dropped on the sea. The body has an internal strengthening band near each end. The tail cone is soldered to the body and carries the fins to which a circular strut is secured. At the other end, the body is closed by a steel diaphragm. The diaphragm has a central opening, threaded to receive a plug, which carries a detonator-burster tube. A nose is fitted to this diaphragm and secured in position by three set screws. Screwed into the nose is a striker guide in which slides a striker needle, secured to a striker head which projects outside the nose. When in its operative position, a transit safety pin engages with the striker head, preventing it from moving inwards. A second safety pin is provided in the nose. This pin is flanged and is spring-loaded outward, but normally is held in positon by a split pin to which a withdrawal wire is secured. A securing wire is passed through the eye of the split pin, around the head of the safety pin and the nose of the marker, and through a boring in the transit safety pin.

Functioning: When the sea marker has been prepared for use and dropped on the surface of the sea, impact of the striker head with the water drives the striker needle inwards and explodes the detonator-burster charge, which disrupts the body and tail cone and scatters the aluminum powder.

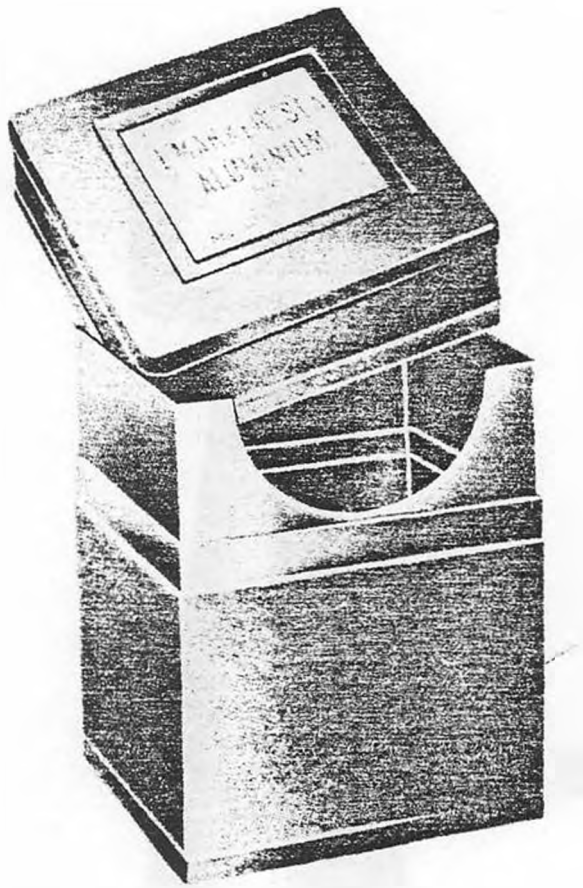


Figure 99—Aluminum Sea Marker Mk I

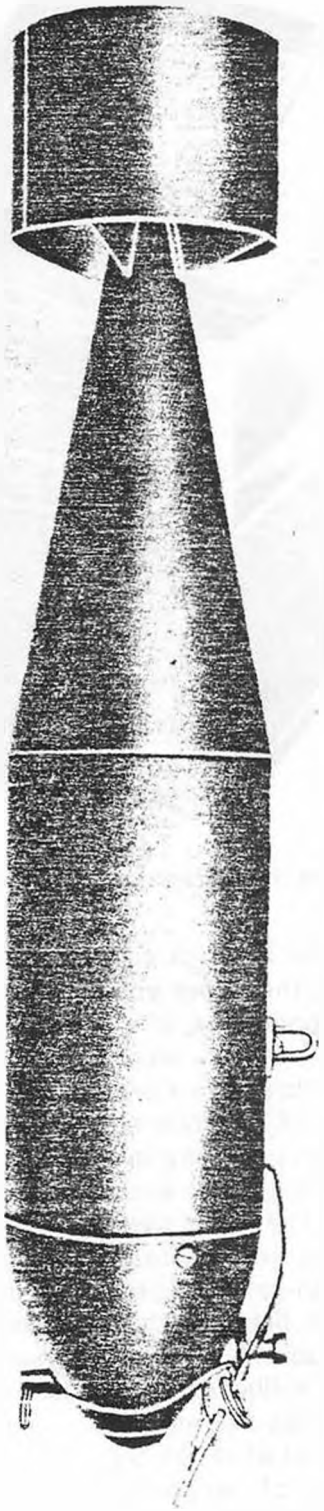
Aluminum Sea Marker Mk V (Service)

Data

Fuzing .....None; impact initiated
Color .....Aluminum over-all
Over-all length (telescope) .....Telescoped, 12.5 in.; extended, 20 in.
Body diameter .....3 in.
Weight .....10 lb.

Description: The sea-marker body has an inner case of sheet metal, the lower end of which is pressed on to a heavy, apertured head. The aperture in the head is sealed by a paper disc and is traversed by a pin. A circular retaining piece is secured to the upper end of the inner case. Inside the inner case is a fabric bag containing aluminum powder, each end of the bag being tied with thread to close it. The thread at the lower end of the fabric bag is passed around a pin, to hold the bag in contact with the head. An outer case slides over the inner case. At its upper end the outer case is closed by two millboard discs, and inside its lower end a circular retaining piece is secured to provide a stop to prevent its being withdrawn completely from the inner case. A cutter is provided immediately below the millboard discs. The cutter is a ring secured inside the outer case and cut across in four places at about 45 degrees. The cut ends are bent up at right angles to form four sharp projections within the outer case.

Functioning: The head is the heaviest part of the marker and consequently will strike the



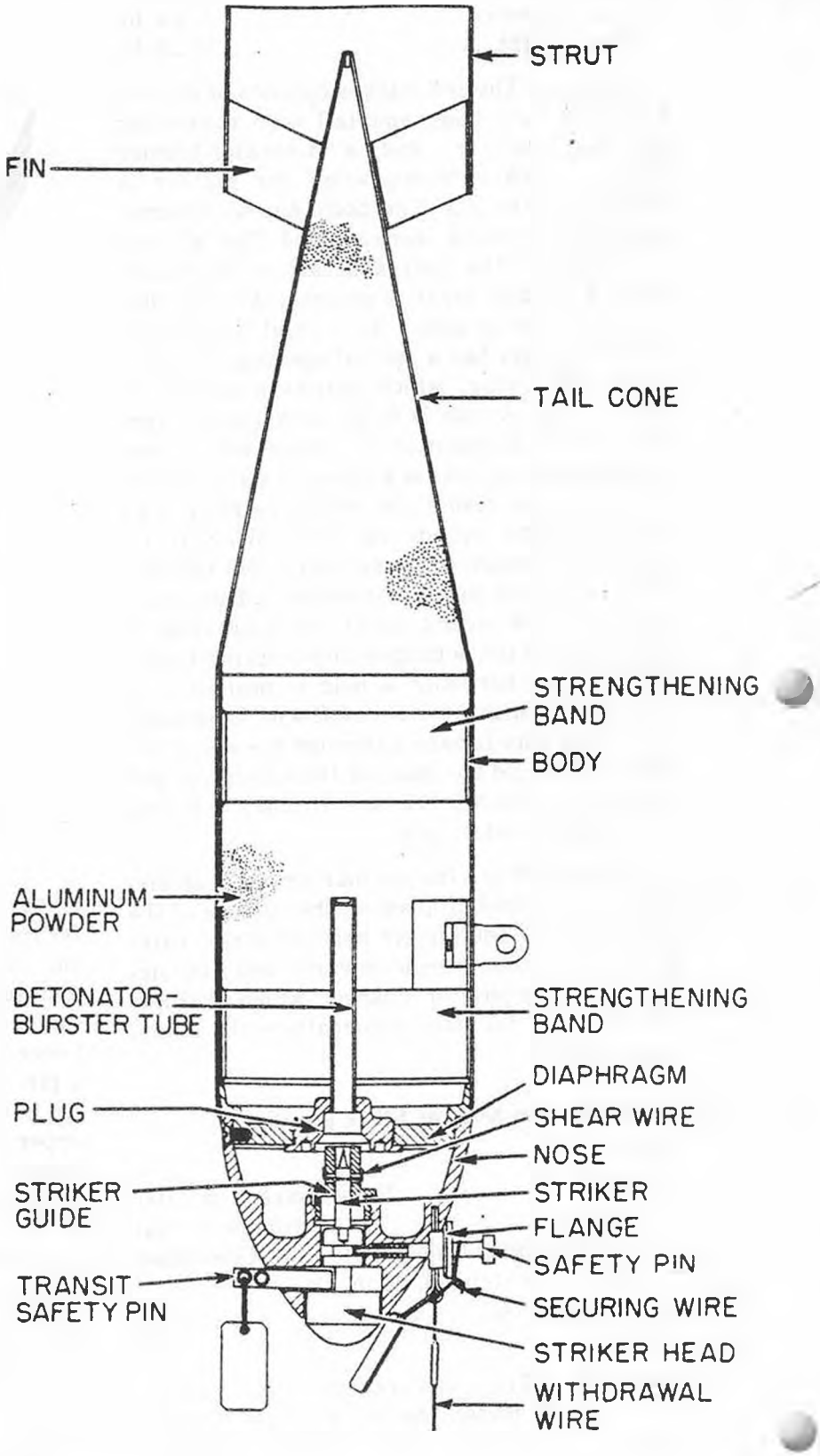
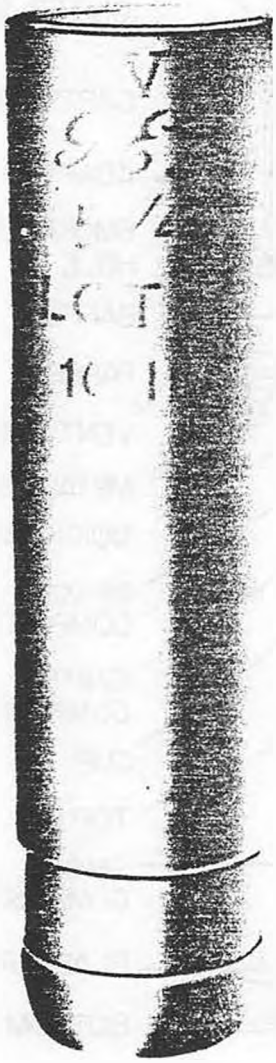


Figure 100—Aluminum Sea Marker Mk III



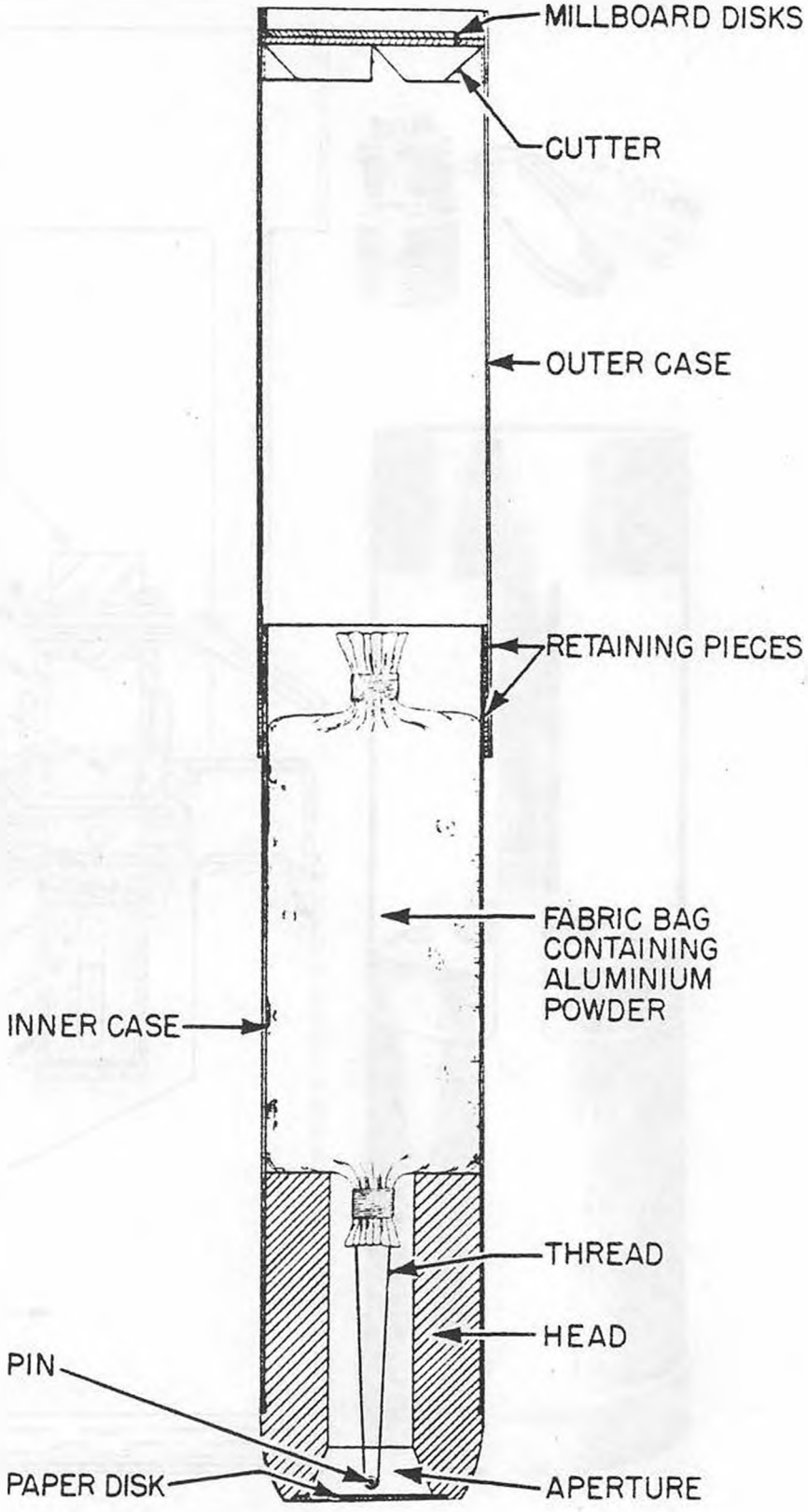


Figure 101—Aluminum Sea Marker Mk V

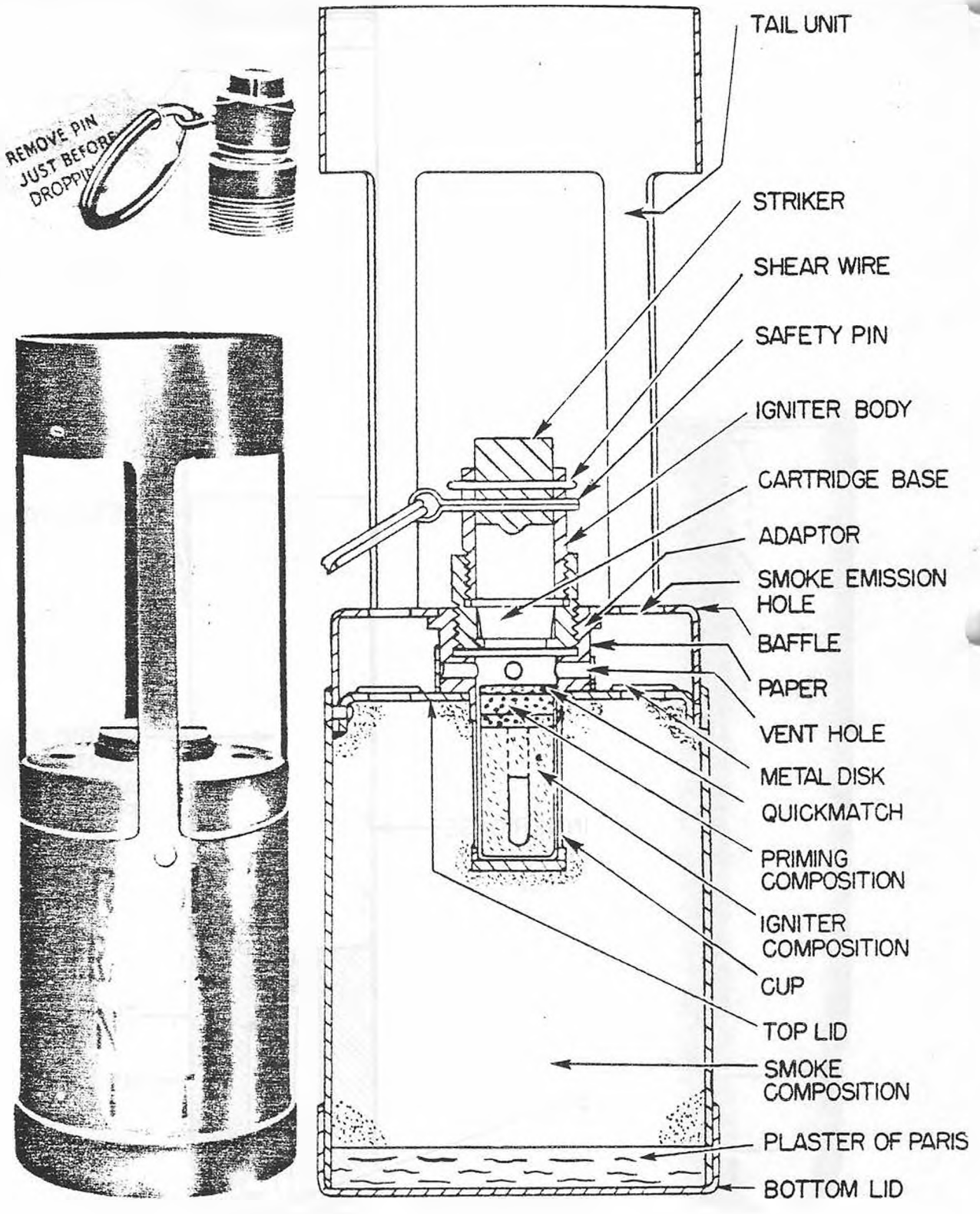


Figure 102—Smoke Generator No. 6

water first when dropped. Impact with the surface of the water breaks the paper disc sealing the aperture in the head. Water enters this aperture and carries the fabric bag rearwards from the head, breaking the thread which anchors it to the pin and also ejecting the millboard discs sealing the aperture at the tail end of the outer case. As the bag passes through this aperture, it strikes the sharp projecting parts of the cutter, which slit it, releasing its contents. As a result a slick of aluminum powder is formed on the surface of the sea.

Remarks: This marker contains no explosives.

Smoke Generator No. 6 Mks I and II (Service)

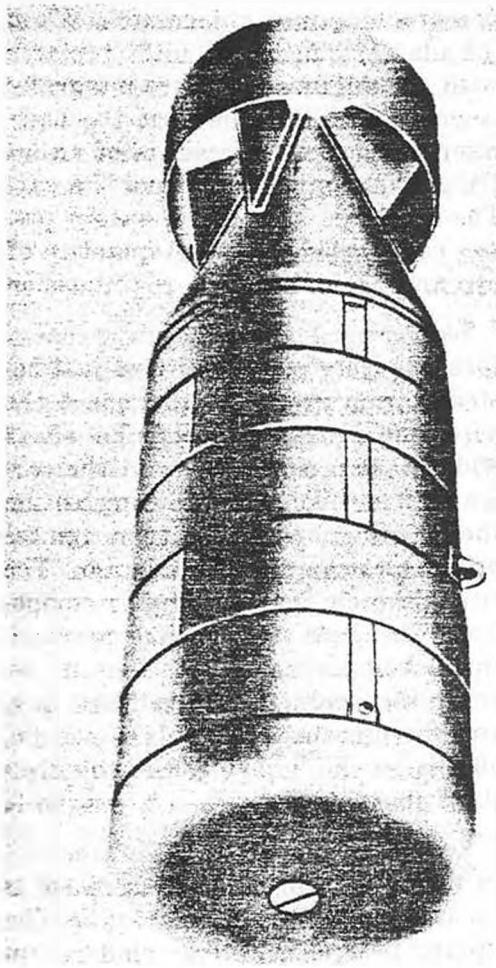
Data

Fuzing	Percussion igniter
Color markings	Light green over-all
Over-all length	7.13 in.
Body diameter	2.42 in.
Total weight	1 lb.
Emission time	2½ min.
Smoke color	Orange

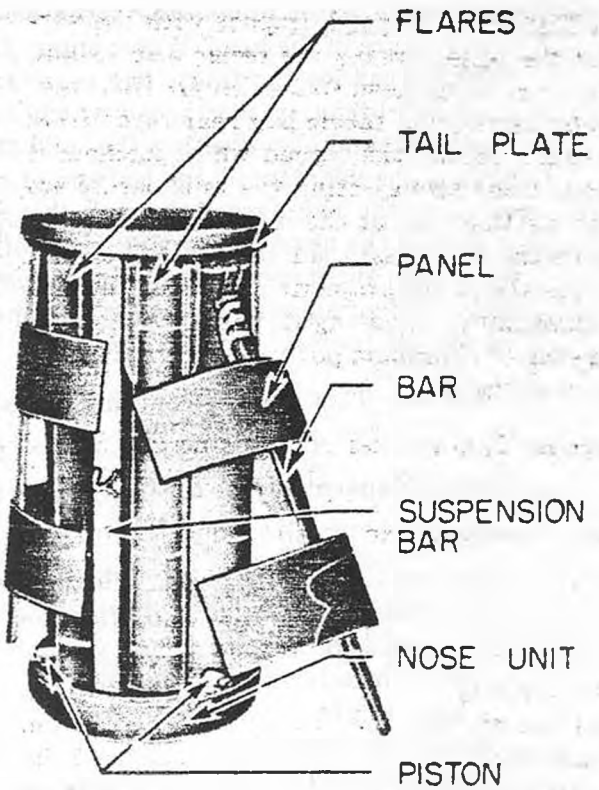
Description: The generator consists of a cylindrical metal body containing smoke composition, a plugged adapter containing igniter composition in a metal foil cup, a quantity of priming composition, and a length of quickmatch. When prepared for use, a percussion igniter replaces the adapter plug. A tail unit is formed integrally with the body, and the upper end of the body is closed by a lid. The igniter consists of an igniter body, a striker supported above the cartridge base by a shear wire, and a safety pin. The cartridge base includes a small quantity of cap composition located between a percussion cap and an anvil.

Functioning: The safety pin is removed just before the generator is dropped. On impact the striker moves downwards, breaks the shear wire, and fires the cap composition in the cartridge base. The flash from the cap composition ignites the quickmatch, which, in turn, ignites the priming composition in the adapter. The priming composition ignites the igniter composition, which then ignites the smoke composition. The heat due to the combustion of the smoke composition loosens the metal discs covering the smoke-emission holes in the top lid, and the pressure of the smoke forces the discs off the top lid, allowing the smoke to escape to the atmosphere.

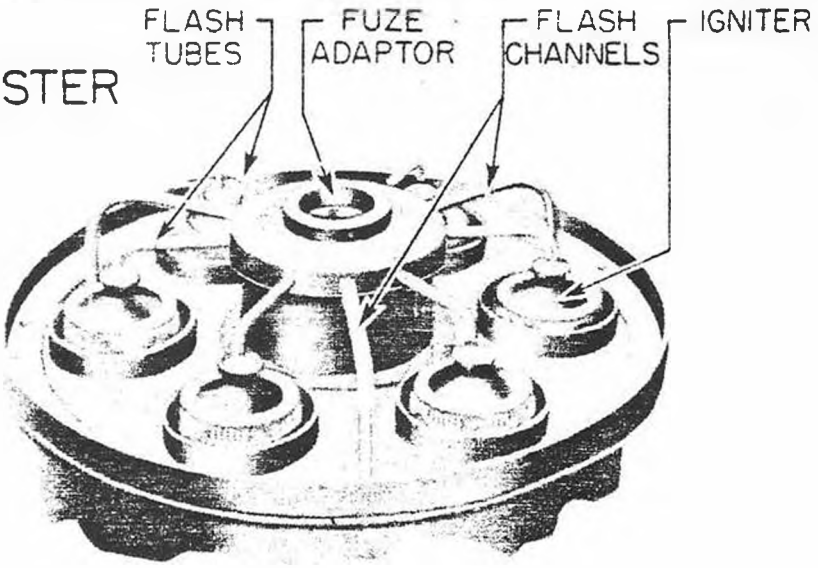
Remarks: This smoke generator is designed to be dropped from an aircraft to enable the pilot to ascertain the direction of the wind on the ground before making an emergency landing.



ASSEMBLED CLUSTER



CLUSTER COMPONENTS



IGNITION ASSEMBLY

Figure 103—Cluster Projectile 270-lb. No. 1 Mk I

Part I—Chapter 21

CLUSTER PROJECTILES

Introduction

A cluster projectile is an assemblage of small bombs or flares held together primarily by resilient straps and beams. It is constructed so as to be an aimable projectile, and is usually fitted with a tail unit for purposes of stabilzation.

At present there are cluster projectiles for flares, incendiary bombs, smoke bombs, and small fragmentation bombs. The cluster projectiles are rapidly replacing the Small Bomb containers as the preferred method for carrying small bombs and flares. Advantages of the cluster projectile include ease of loading and installation in the aircraft, increased number of bombs or flares contained in the same space, and increased accuracy.

A new and improved type of cluster, called the Nose Ejection Cluster, was put into production just before the end of World War II. These clusters are discussed in general at the end of this chapter, and available details listed in tabular form.

Fuzes are incorporated in the cluster projectiles to disintegrate the cluster itself and so permit the indivdual bombs or flares to disperse and fall freely. Cluster projectiles have explosive channels and pellets so designed as to break up the cluster without injuring any of the contained bombs. Flare and incendiary clusters are fuzed either at the nose or at the tail, while fragmentation and smoke bomb clusters now in service are fuzed in the tail only. Nose ejection clusters are tail fuzed only and use two tail fuzes to insure functioning.

The bombs or flares are usually shipped already packed in the cluster projectile, so that assembly of the complete round is not necessary in the field. The fuze of the cluster is generally installed just prior to loading the projectile on the aircraft.

Cluster Projectile 270-lb. No. 1 Mk 1 (Service)

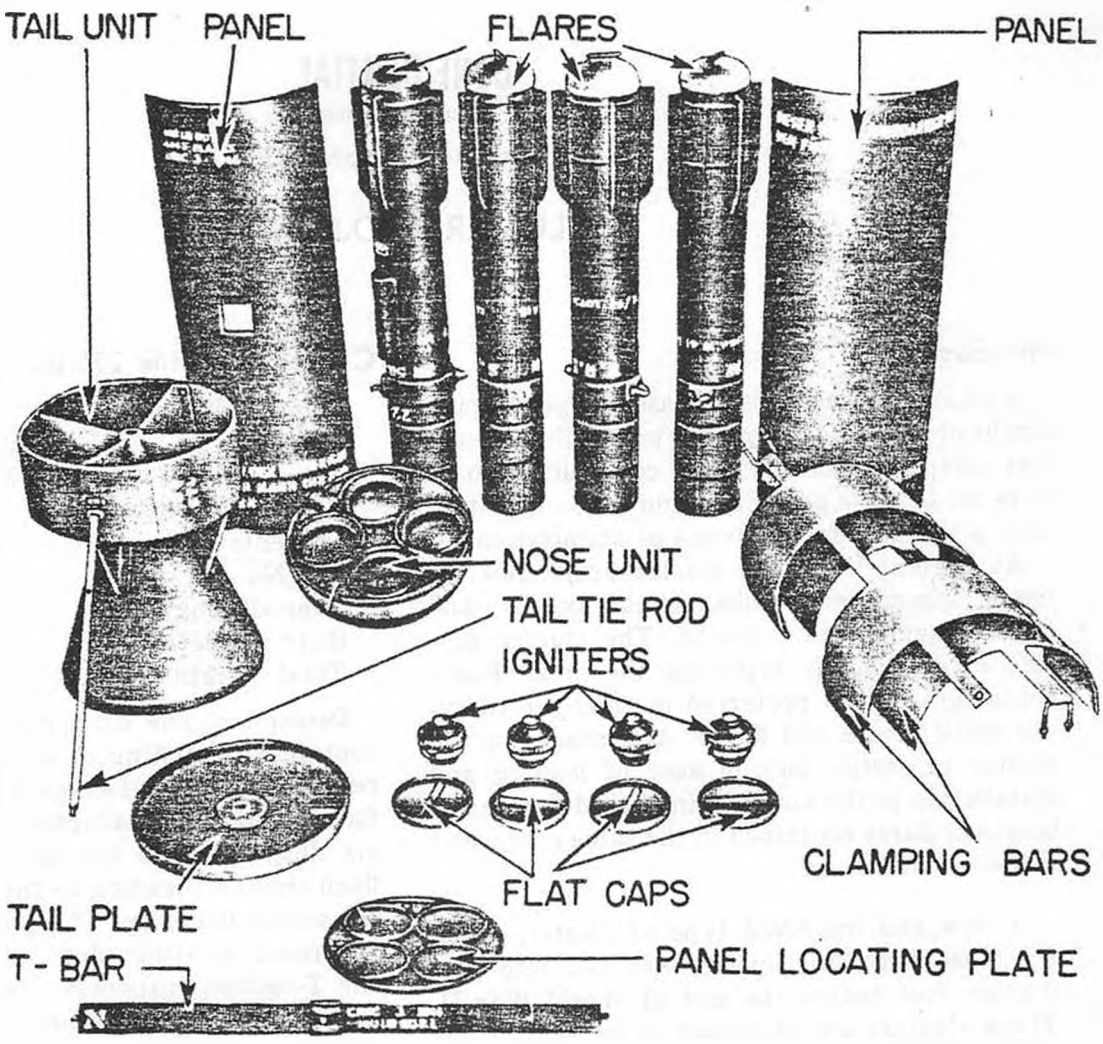
Data

Fuzing	Nose Fuze No. 42, 848, 849, or 860 Mk II
Color markings	Dark green over-all
Contents	Seven 4.5-in. flares
Tail No.	No. 69 Mk I
Over-all length	62.75 in.
Body diameter	18 in.
Total weight	260 lb.

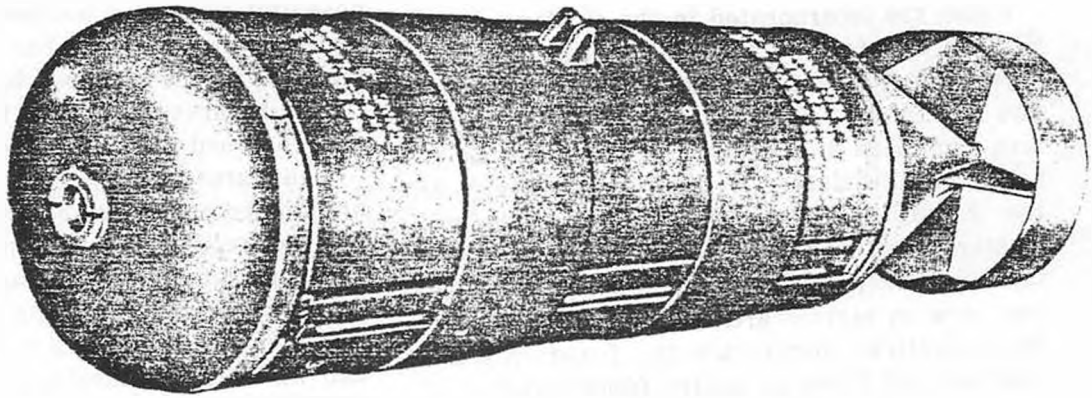
Description: The cluster is a cylindrical metal container consisting of a nose unit, recessed to receive the noses of seven 4.5-in. reconnaissance flares, and a fuze adapter, from which radiate six flash tubes to the flare igniters and three flash channels leading to the explosive pellets in the piston housings. The nose unit is secured to the panel locating plate and the tail plate by the T-section suspension bar and the clamping bars. The clamping bars consist of a bar to which are welded two panels. The clamping bars locate the panels and are secured through the panel locating plates to the tail plate and to the nose unit by spring washers and nuts. The nuts securing the clamping bars to the piston housings are further secured by split pins. The tail tie rod is screwed into the tail plate and the tail unit fastened to it by a spring washer and nut.

The flares, from which the suspension lugs and domed caps have been removed, are located by the recesses in the nose unit and panel locating plate. The flares are fuzed with special igniters, consisting of the body and dome portion of the Fuze No. 42 without the percussion cap and striker mechanism, and sealed with primed cambric.

Tail Construction: The Tail No. 69 Mk I consists of a sheet-metal tail cone to which a cylindrical strut is attached by four fins. The tail unit is attached to the tail plate of the cluster by a tie rod, which passes down the center axis of the tail wire.



CLUSTER COMPONENTS



ASSEMBLED CLUSTER

Figure 104—Cluster Projectile 140-lb. No. 2 Mk I

Functioning: On release from the aircraft, the cluster falls normally until the fuze functions. When the fuze functions, the flash from the magazine passes through the flash tubes to ignite the igniters in the nose of each flare, and through the flash channels to explode the gunpowder pellets in the piston housings. The explosion of the pellets forces the pistons out of their housings, causing the clamping bars to swing outwards, thus releasing the nose unit, panels, and initiated flares. The flares then function in the normal manner.

Suspension: The cluster is suspended by a single lug secured to a T-section suspension bar, which runs from the nose to the base of the cluster.

Cluster Projectile 140-lb. No. 2 Mk I (Service)

Data

Fuzing.....Nose Fuzes No. 848, 849, or 860 Mk II
Color markings .....Dark green over-all
Contents .....Four 4.5-in. flares
Tail No. .....No. 70 Mk I
Over-all length .....53.25 in.
Body diameter .....12.35 in.
Total weight .....140 lb. (approx.)

Description: This cluster is designed to hold four 4.5-in. flares. The components of the cluster consist of a nose unit, four flat caps which replace the dome-shaped tail closing caps of the flares, a T-bar, a panel locating plate, a tail plate, two clamping bars, two panels, and a tail unit.

When the cluster projectile is assembled, the four flares are located between the nose unit and the panel locating plate, and the assembly is held together by the clamping bars. The tail plate is also retained in position by the clamping bars, and the tail unit is secured to the tail plate by a nut and washers fitted to one end of a tie-rod, whose other end is screwed into the tail plate. The panels enclose the flares, and the T-bar, which positions the panel locating plate and the tail plate relative to the nose unit, carries a suspension lug by which the cluster projectile is attached to a bomb carrier.

Tail Construction: Tail Unit No. 70 Mk I consists of a shortened tail cone, the base of which fits over the rim of the tail plate, and a tail strut secured to the tail cone by four fins. The tail unit is attached to the tail plate of the cluster by a tie-rod which passes down the center axis of the tail cone.

Functioning: The fuzed cluster projectile is released from the aircraft, and the fuze is set in operation. When the gunpowder in the fuze magazine explodes, the flash ignites the gunpowder contained in the small bag in the fuze adapter of the nose unit. The boosted flash passes through the six flash tubes, initiates the igniters fitted to the four flares, and fires the gunpowder in the piston housings.

The gases formed by the ignition of the gunpowder in the piston housings force the pistons out of the housings, shearing the brass shear pins, and so causing the clamping bars to swing outward on the U-bolts. This outward movement of the clamping bars releases the nose unit, the panels, and the initiated flares. The parts of the disintegrated cluster fall separately, and the flares, initiated by their igniters, function in the normal manner.

Suspension: This cluster is designed for suspension in British aircraft only. A single suspension lug is fitted to the T-bar of the cluster.

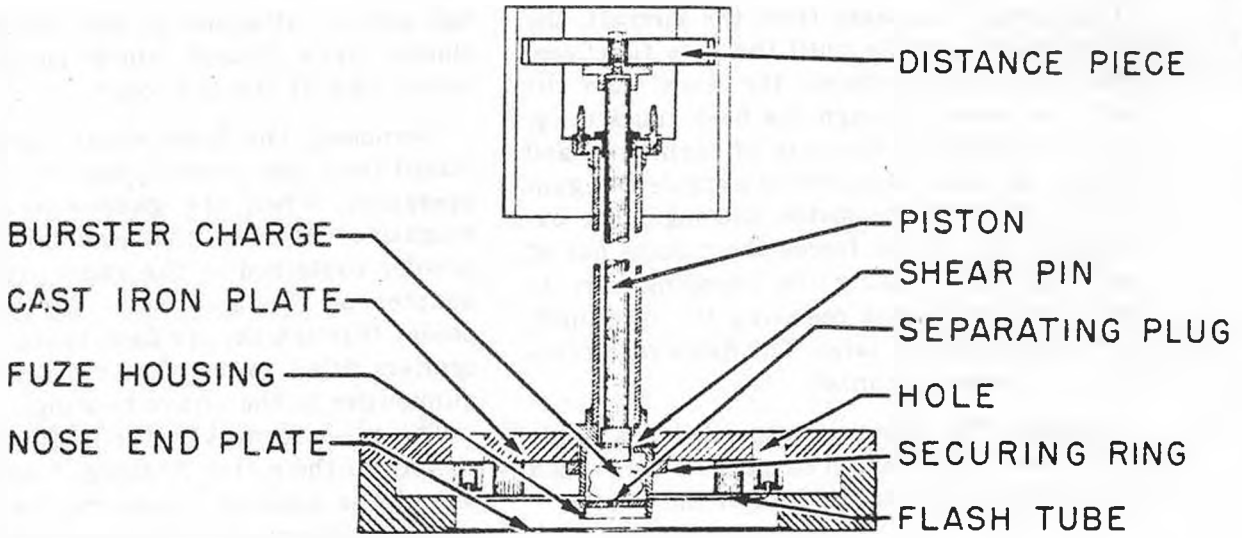
Remarks: In addition to normal stencilling in English, propaganda messages in German are stencilled in white paint on the sides of the panels.

Cluster Projectile 400-lb. No. 3 Mk I (Service)

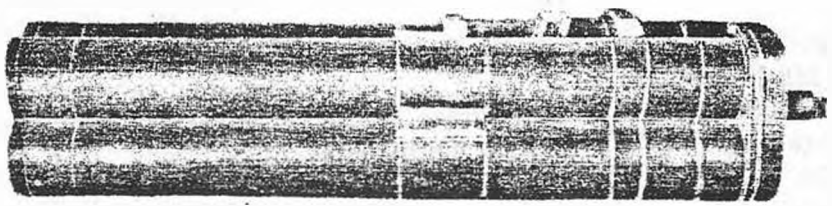
Data

Fuzing .....Nose Fuze No. 860
Color markings .....Black over-all
Contents .....Four 7-in. hooded flares
Over-all length .....72.5 in.
Body diameter .....18 in.
Total weight .....400 lb.

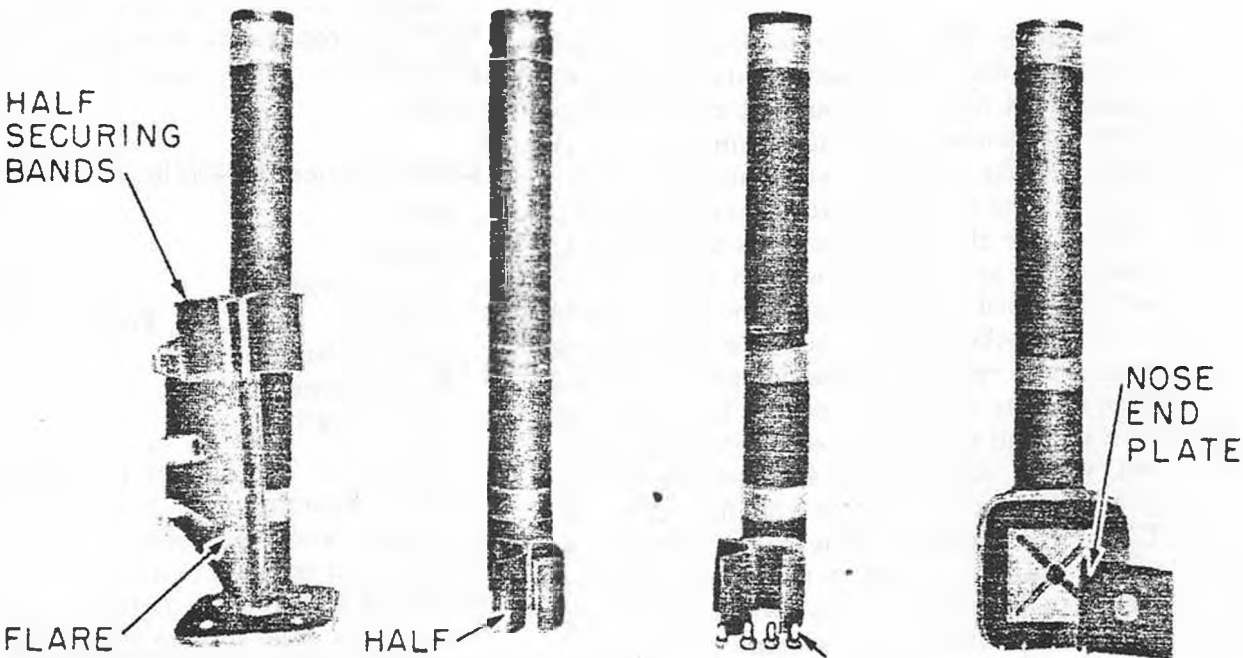
Description: The cluster projectile consists of a flare-supporting unit, heavy nose, half securing bands, and the hooded flares. The flare-supporting unit consists of a square cast-iron plate, on which is painted a narrow white alignment strip, and a steel tube to which is welded a suspension web. The rear end of the tube is flanged, and four equispaced pins are riveted to the flange. External threads on the fuze housing receive the plate-securing ring, which secures the plate to the tube. The tube is also internally



RELEASE MECHANISM



ASSEMBLED CLUSTER



CLUSTER COMPONENTS

Figure 105—Cluster Projectile 400-lb. No. 3 Mk I

threaded at the nose end to receive the fuze and a centrally drilled separating plug.

Four flash channels are drilled through the walls of the fuze housing immediately above the separating plug. Four flash tubes lead from these flash channels to the four equispaced holes in the plate drilled to receive the flare igniters. The piston, flanged at the protruding tail end, is housed in the tube and retained in position at the nose end by two shear pins. A space between the nose end of the piston and the centrally drilled separating plug forms a burster chamber, which is filled with a small fabric bag containing 80 grams of gunpowder when the cluster is fuzed. The heavy cast-iron nose, on which is painted a white alignment strip, and to which the flare supporting unit is bolted, is slotted to receive the flash tubes and the Fuze No. 860. The nose end plate is retained in position by the fuze. The four flares are fitted with special igniters instead of fuzes, and are retained in position in the cluster by half securing bands. The igniters are located in the drilled holes in the plate.

The four half securing bands of the flare securing unit are seated on the flange, and each is retained in position by a socket, welded to the outside of the band, engaging with a corresponding dowel pin. The sockets are covered by metal bridges in which are cut horizontal slots to receive the flange of the piston. This prevents premature displacement of the flares. The four remaining half securing bands are placed in position round the flares and bolted to the other half bands. A cruciform distance piece is bolted to the tail end of the piston.

Functioning: On release from the aircraft, the cluster falls in a normal manner until the fuze functions. The flash from the fuze magazine passes through the flash channels and the flash tubes to activate the igniters, and through the separating plug to the burster charge. The explosion of the burster charge forces the piston towards the tail end of the cluster to sever the shear pins and to lift the half securing bands off the dowel pins by means of the flange of the piston engaging in the bridges. The four flares are thus lifted off the plate of the flare supporting unit. A three-second delay in the flare igniters allows the cluster to disintegrate before the flares function.

Cluster Projectile 500-lb. No. 4 Mk I (Service)

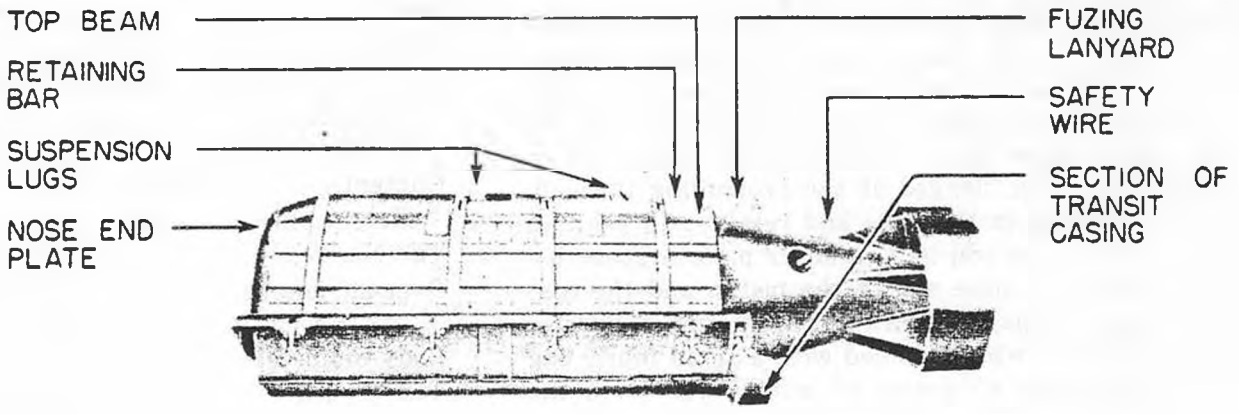
Data

Fuzing	Tail Fuze No. 867 Mk I or No. 885 Mk I
Color markings	Dull red over-all; one of tensioning straps painted bright red
Contents	Fourteen 30-lb. type J incendiary bombs
Tail No.	No. 44 Mk I or II
Over-all length	Mk I tail, 69 in. Mk II tail, 75 in.
Body diameter	15 in.
Tail length	Mk I, 25.75 in. Mk II, 31.75 in.
Total weight	477 lb.

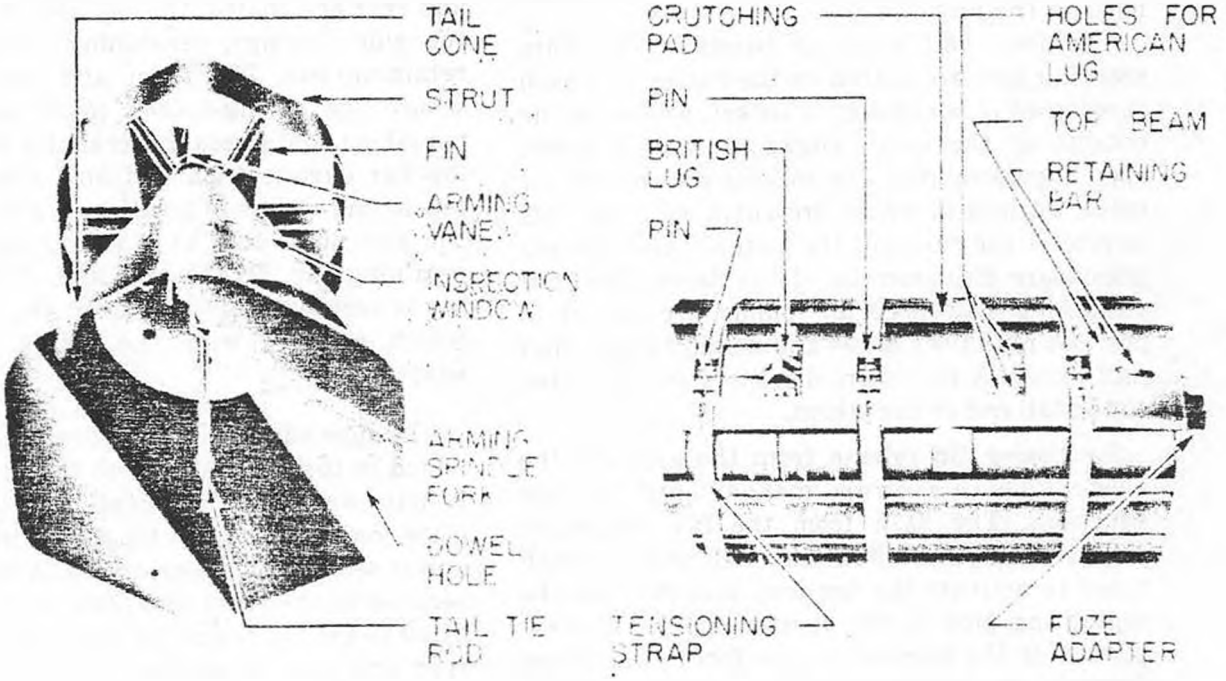
Description: This cluster is hexagonal in shape, and contains fourteen 30-lb. type "J" incendiaries, in two fagots of seven bombs each. The bombs are placed nose-to-nose and arranged in super-imposed rows of 2, 3, and 2 in each fagot. The bombs are retained in positon by the front and rear end plates, the top and bottom beams, the side fairings, tensioning straps, and the retaining bar. The front and rear end plates secure the spring-loaded covers of the bomb parasheet containers. Lateral pins on the retaining bar engage with and hold the tabs of the tensioning straps in position. A shear wire near the end plate acts as a safety device for the retaining bar. To the rear end of the retaining bar is secured a pivoted lever, the lower end of which engages with the piston in the fuze adapter.

The fuze adapter is fixed to the channel plate, which in turn is fastened to the rear end plate. A nut, welded to the center of the rear end plate, receives the tail tie rod to which the tail unit is secured by a tension nut. A nose fairing is secured to the front end plate, and fairings are fitted to the top beam. The fairing adjoining the rear end plate is slotted to receive the fuzing lanyard of the fuze and the safety wire of the tail unit.

Tail Construction: The Tail Unit No. 44 Mk I is located by two dowel pins and is provided with two inspection windows to ensure correct alignment of the arming forks. A tie rod connects the tail unit to the cluster.

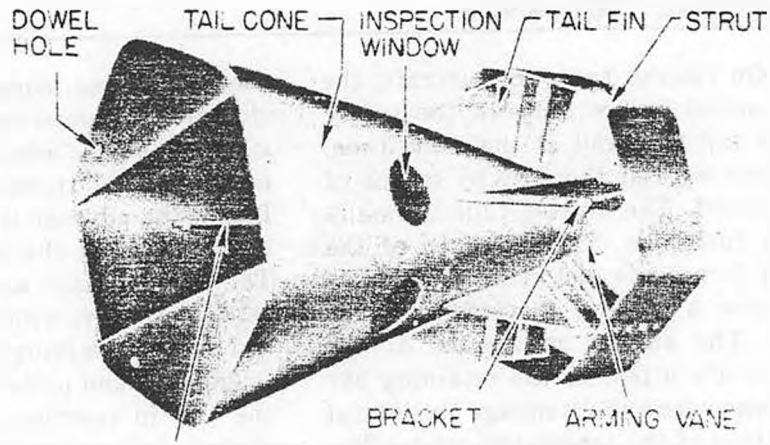


ASSEMBLED CLUSTER

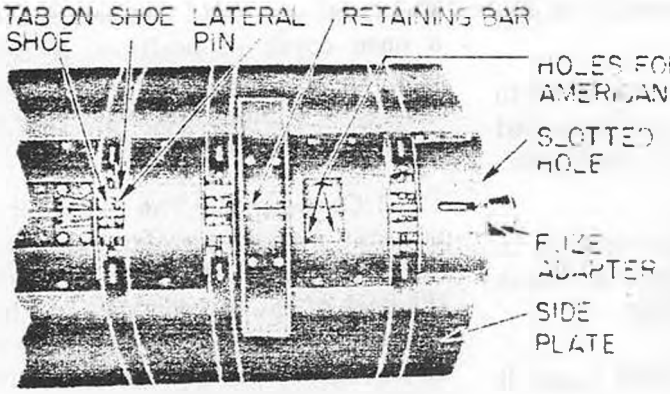


TAIL NO. 44 MK II ASSEMBLY DETAILS

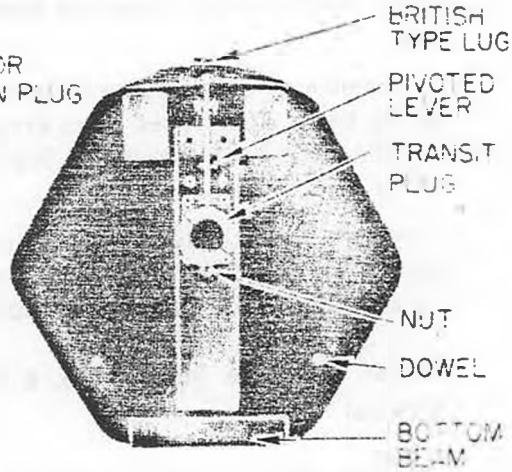
Figure 106—Cluster Projectile 500-lb. No. 4 Mk I



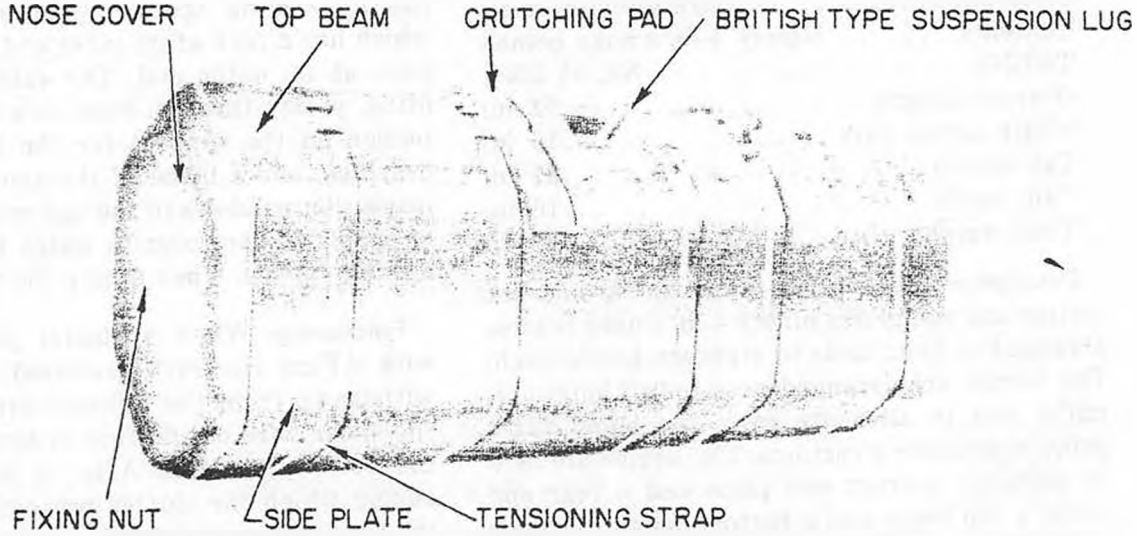
TAIL NO. 45 MK I



ASSEMBLY DETAILS



REAR END PLATE



ASSEMBLED CLUSTER WITHOUT TAIL

Figure 107—Cluster Projectile 500-lb. No. 6

Functioning: On release from the aircraft, the fuze-setting control link withdraws the safety wire from the tail unit and at the same time, breaks the shear wire of the fuze by means of the fuzing lanyard. The cluster falls normally until the fuze functions. The explosion of the fuze magazine forces the piston forward in its housing to cause a rocking movement of the pivoted lever. The sudden movement of the pivoted lever exerts a pull on the retaining bar to break its shear wire and disengage the lateral pins from the tabs of the tensioning straps. The straps, thus released, fly outwards to release the 14 bombs, which function normally on impact.

Suspension: A single suspension lug is fitted to the top beam, and tapped holes are also provided for the fitting of American lugs where necessary.

Remarks: This cluster projectile is designed to replace the Small Bomb Container as a means of carrying 30-lb. type J incendiaries.

Cluster Projectile 500-lb. No. 6 Mks I and II (Service)

Data

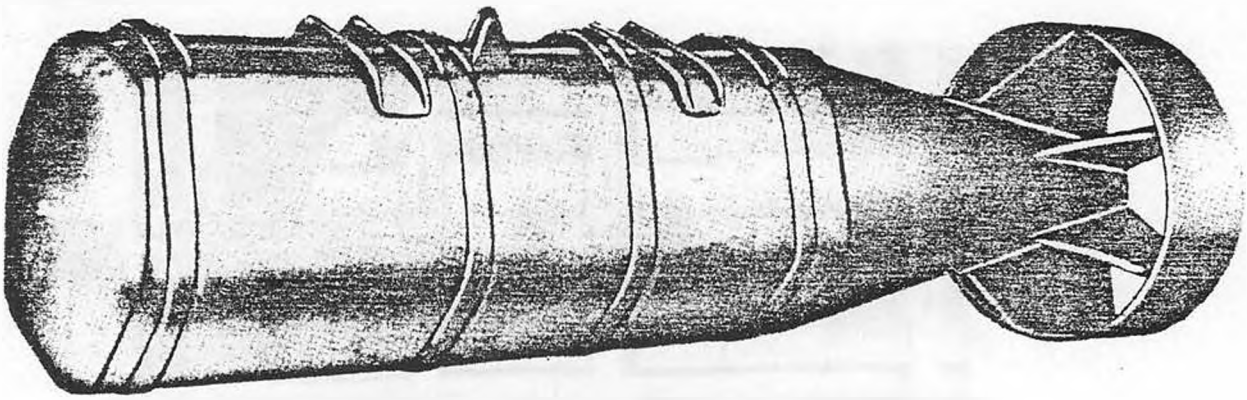
Fuzing	Tail Fuze No. 885 Mk I
Color markings	Dark green over-all
Contents	Ninety 4-lb. smoke bombs
Tail No.	No. 45 Mk I
Over-all length	72 in.
Width across flats	16 in.
Tail length	27 in.
Tail width	16 in.
Total weight	428 lb.

Description: The cluster is hexagonal in cross section and comprises ninety 4-lb. smoke bombs, arranged in five fagots of eighteen bombs each. The bombs are arranged nose-to-tail longitudinally, and in alternate rows the bomb fuzes point in opposite directions. The bombs are held in place by a front end plate and a rear end plate, a top beam and a bottom beam, four side plates, tensioning straps, and a retaining bar. Lateral pins on the retaining bar engage tabs forming part of shoes attached to the ends of the tensioning straps. A shear wire passes through the retaining bar and a bridge on the top beam. The four side plates, together with the two beams, completely surround the bomb cluster. A channel secured to the rear end plate supports a fuze adapter, the outer end of which is closed by a transit plug and leather washer. Inside the adapter is a piston through which is a pin to engage the lower end of a pivoted lever. The fuze adapter and piston are slotted to receive the lever, which is connected at its upper end to the retaining bar.

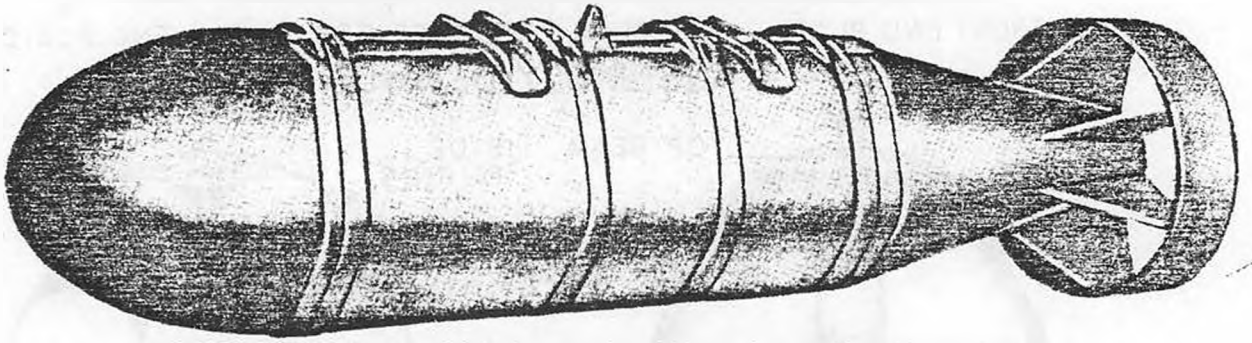
The rear end plate has two dowels for locating the tail in position, and a nut welded to the center of the plate receives one end of a tail tie rod when the tail unit is fitted to the cluster. The front end plate has two dowels for locating a nose cover in position. A securing bolt is screwed into the center of the nose end plate to receive a fixing nut, when the nose cover is fitted to the cluster.

Tail Construction: The tail unit consists of a tail cone with an approximately hexagonal base, and a tail strut secured to the cone by fins. At the base of the tail cone are two holes to fit over the dowels on the rear end plate of the cluster. A tie rod passes through the center of the tail and one end of this rod is threaded to screw into the central nut on the rear end plate. The other end of the rod is fitted with a tensioning nut for securing the tail to the cluster. The tail unit also has an arming spindle mounted in bearings, which has a fork at its inner end and an arming vane at its outer end. The safety wire, when fitted, passes through holes in a bracket, a projection on the support for the arming spindle bearings, and a blade of the arming vane. Two inspection windows in the tail cone are provided to enable the armorer to watch the fork of the arming spindle, when fitting the tail unit.

Functioning: When a cluster projectile fuzed with a Fuze No. 867 is released, safety wire is withdrawn from the tail-unit arming vane and the shear wire of the fuze is broken to release the fuze safety pin. After a period of delay during which the cluster projectile falls freely, the fuze magazine is fired. The products of combustion of the magazine charge force the piston in the fuze adapter against the lower end of the pivoted lever, which is thus rocked about its pivot and exerts a pull on the retaining bar of the cluster. The pull breaks the shear wire passing through the retaining bar, and moves



ASSEMBLED CLUSTER WITH BLUNT NOSE



ASSEMBLED CLUSTER WITH STREAMLINED NOSE

Figure 108—Cluster Projectile 500-lb. No. 7 Mk I

the bar so that its pins disengage the tabs on the shoes attached to the tensioning straps. The straps then fly outwards and the cluster disintegrates, its component parts falling away separately. The individual bombs function on impact.

Suspension: A British type suspension lug is fitted to the top beam of the cluster, and tapped holes are provided for fitting American type lugs.

Remarks: The Cluster Mk I contains 90 4-lb. Smoke Bombs Mk III. The Cluster Mk II is identical to the Mk I, except that it contains 90 4-lb. Smoke Bombs Mk II** or Mk IV.

If the smoke composition used in the 4-lb. smoke bombs gets wet, and especially if wetted by sea water, it is liable to spontaneous combustion through chemical action.

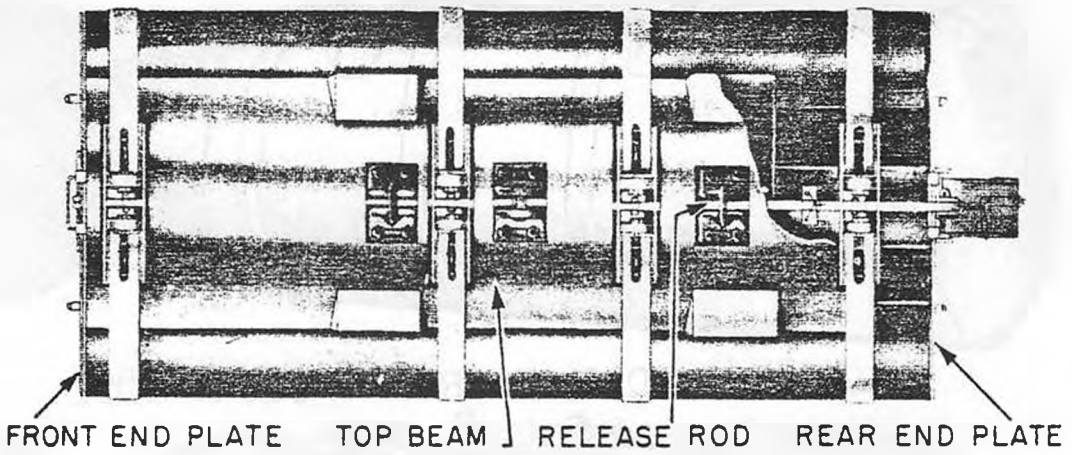
Cluster Projectile 500-lb. No. 7 Mk I (Service)

Data

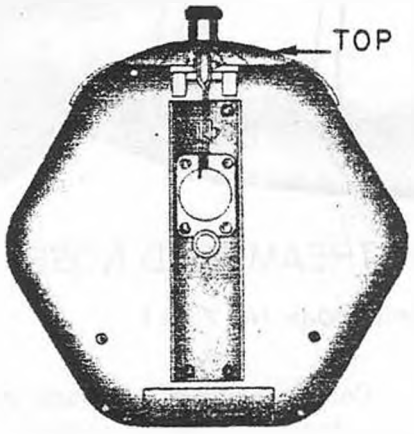
Fuzing.....Tail Fuze No. 885 Mk I
Color markings....Dark green over-all; one tensioning strap painted red
Contents.....Fifty-six 8-lb. F. Bombs Mk II
Tail No. .....No. 46 Mk II
Over-all length .....67 in.
Body diameter .....15 in.
Tail length .....27.75 in.
Tail diameter .....18 in.
Total weight .....550 lb.

Description: This cluster consists of eight fagots of seven 8-lb. F. bombs each. The fagots are retained by top and bottom beams, front and rear end plates, side fairings, and four tensioning straps. The tensioning straps are held by lateral pegs on the release rod, which is located in the top beam. The release rod is connected to a lever and piston mechanism, the cylinder of which also serves as the adapter for the barometric fuze and is located on the rear end plate. Before the fuze is fitted, the adapter is closed by the inverted cup portion of the safety device for the release mechanism.

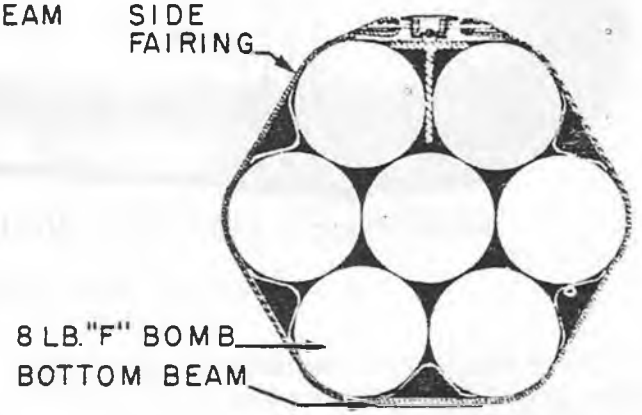
To convert the cluster into an aimable cluster,



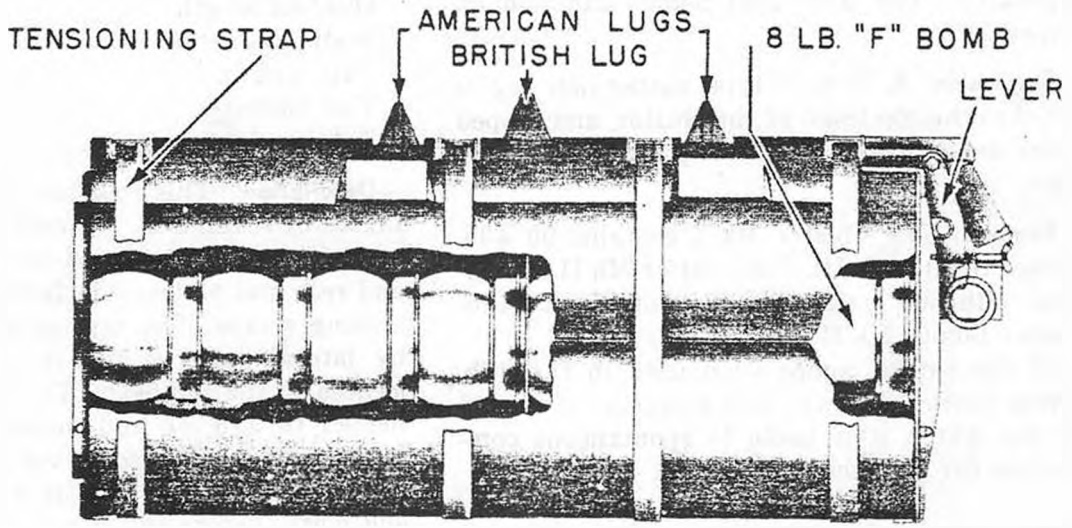
ASSEMBLY DETAILS



REAR END PLATE



AXIAL FILLING ARRANGEMENT



LONGITUDINAL FILLING ARRANGEMENT

Figure 109—Cluster Projectile 500-lb. No. 7 Mk I

a blunt nose fairing and drum-type tail are fitted to the front and rear end plates, respectively. A special streamlined nose fairing is provided for use when the cluster is to be stowed externally on the plane.

Functioning: On release from the aircraft, the cluster falls until the fuze functions. The explosion of the magazine forces the piston forward in its housing and causes a rocking motion of the pivoted lever. The sudden movement of the lever exerts a pull on the retaining bar and breaks the shear wire, disengaging the lateral pins from the tabs of the tensioning straps. The straps are thus released and fly outwards, releasing the contained bombs.

Cluster Projectile 500-lb. No. 14 Mk I (Service)

Data

Fuzing .....Noze Fuze No. 42 Mk IV
Color markings.....Dull red over-all; one of tension straps painted bright red
Contents .....one hundred and six 4-lb. incendiary bombs
Tail No. .....No. 42 Mk I
Over-all length .....67 in.
Body diameter .....14 in.
Tail length .....21 in.
Tail diameter .....14 in.
Total weight .....450 lb.

Description: The cluster comprises two fagots of 53 bombs each. The bombs in the two fagots are arranged nose-to-tail, and with their safety plungers inwards so that they are all depressed. The bombs are held in place by a front end plate and a rear end plate, a top beam and a bottom beam, four wooden slats, tensioning straps, and a retaining bar having lateral pins which engage tabs on the tensioning straps. A shear wire passes through a bridge and the retaining bar at a position near the rear end plate. A channel, secured to the rear end plate, supports a fuze adapter, the outer end of which is closed by a transit plug fitted with a leather washer. Inside the adapter is a piston through which a pin is arranged to engage the lower end of a pivoted lever. The fuze adapter and the piston are slotted to receive the lever. The upper end of the lever is forked and is connected to the retaining bar. The rear end plate has two dowels for locating the tail in position, and a nut welded to the center of the rear end plate to receive one end of a tail tie rod when the tail unit is fitted to the cluster. A nose cover is fitted to the front end plate to decrease the drag of the cluster.

Tail Construction: The Tail Unit No. 42 Mk I is a shortened drum-type tail, having a tail cone to which a tail ring is secured by fins. At the base of the tail cone are two holes to fit over the dowels on the rear end plate of the cluster. The tail unit is fitted with a bearing for an arming spindle, so that, if it should ever be required to fuze the cluster with an air armed fuze, a suitable arming spindle with an arming vane could be readily fitted. Also, to provide against this contingency, a bracket to receive a safety wire is welded to the tail cone and a hole passes through a projection on the support for the arming-spindle bearings. A tie rod passes through the center of the tail, and one end of the rod is screw threaded to go into the central nut of the rear end plate. Two windows, one of which is open, are provided in the tail cone. The open window is provided so that when the cluster is prepared for use, the fuzing link, connected to the pull percussion mechanism of the Fuze No. 42 Mk IV, can be passed through it and connected to the fuzing unit of the bomb carrier.

Functioning: When a cluster is released from an aircraft, the fuze functions, and after a period of delay during which the cluster projectile falls freely, the fuze magazine charge is fired. The products of combustion of the magazine charge force the piston in the fuze adapter against the lower end of the pivoted lever, which is thus rocked about its pivot and exerts a pull on the retaining bar of the cluster. This causes the retaining bar to break its shear wire, and to move so that the pins on the bar disengage the tabs on the tensioning straps. The straps then fly outwards and the cluster disintegrates, the component parts falling away separately. The individual 4-lb. bombs function on impact.

Suspension: A British type suspension lug is fitted to the top beam, and tapped holes in the beam are provided for fitting American type lugs.

Cluster Projectile 750-lb. No. 15 Mk I (Service)

Data

Fuzing .....Nose Fuze No. 42 Mk IV

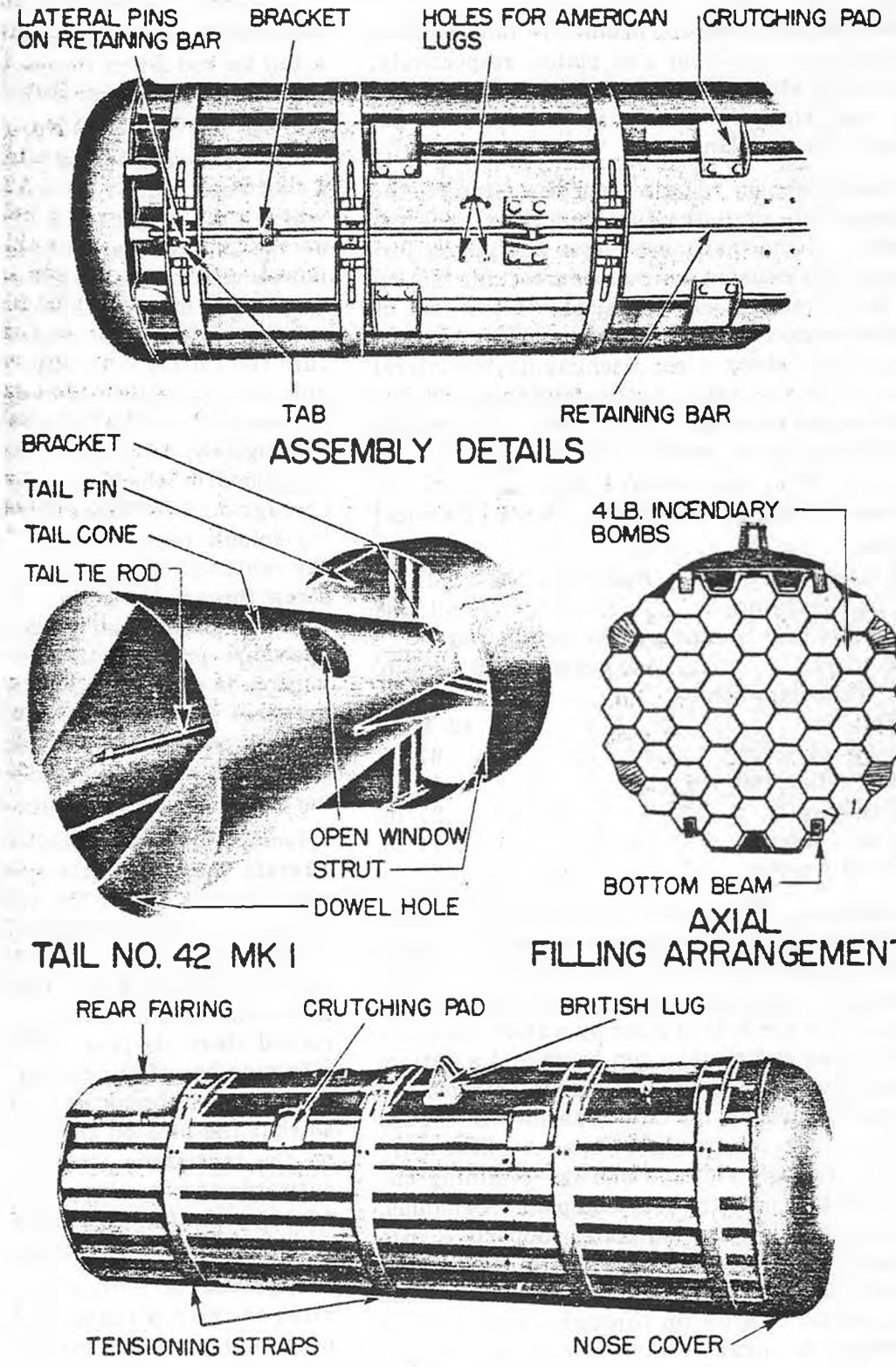
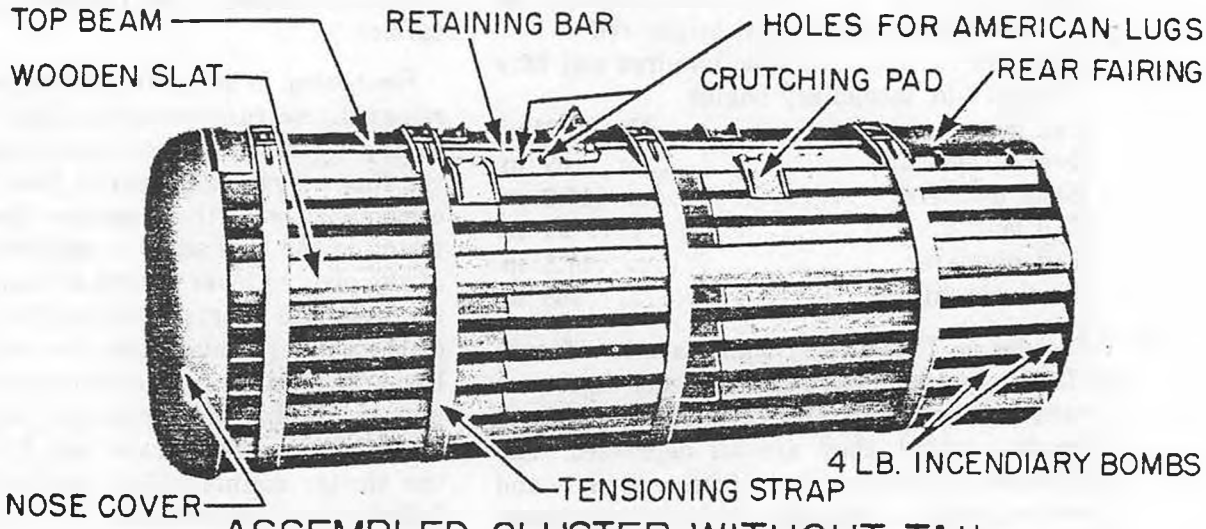
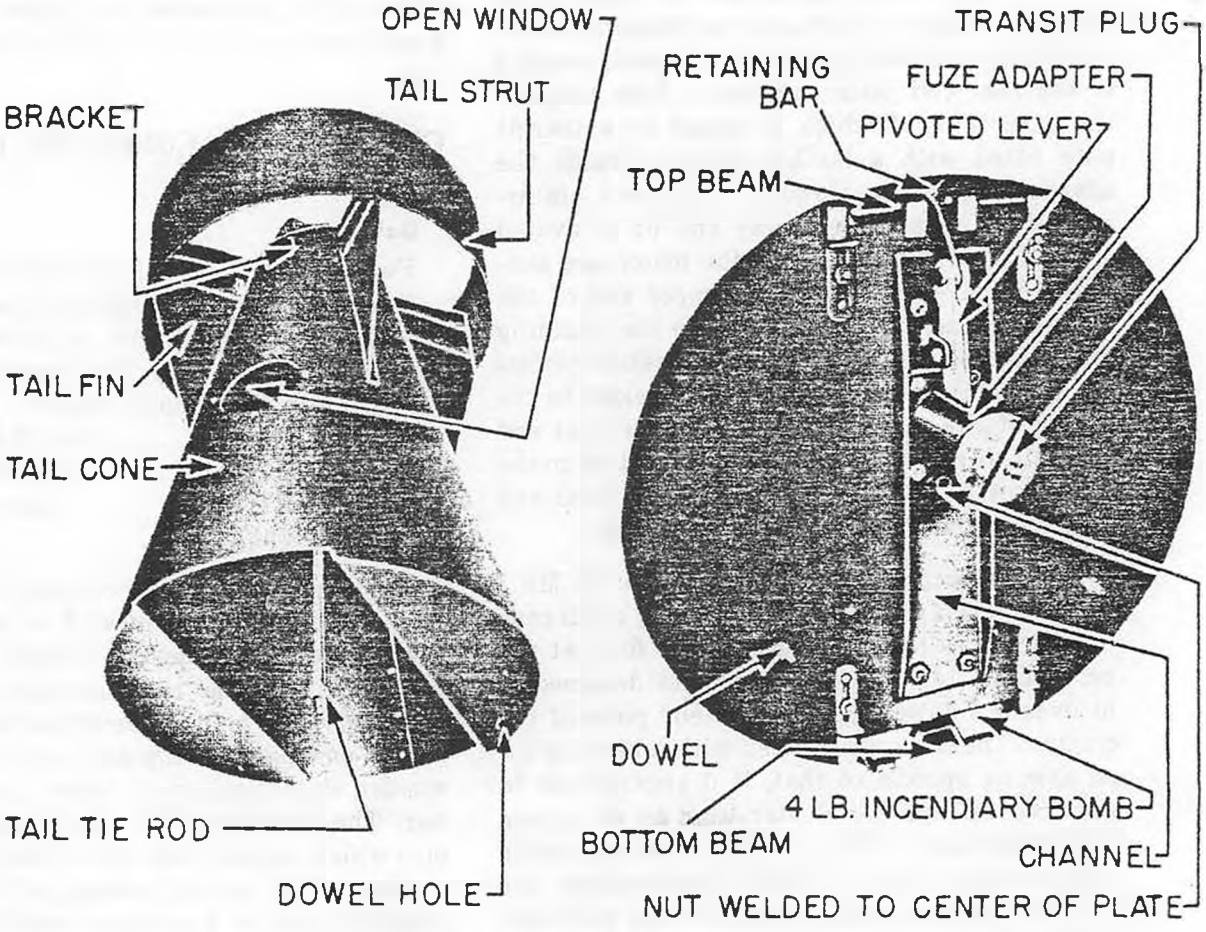


Figure 110—Cluster Projectile 500-lb. No. 14 Mk I



ASSEMBLED CLUSTER WITHOUT TAIL



TAIL NO. 43 MK I

REAR END PLATE

Figure 111—Cluster Projectile 750-lb. No. 15 Mk I

Color markings.....Dull red over-all; one tensioning strap painted bright red
Contents .....One hundred and fifty eight 4-lb. incendiary bombs
Tail No.....No. 42 Mk I
Over-all length .....67 in.
Body diameter .....17.3 in.
Tail length .....21 in.
Tail diameter .....17.3 in.
Total weight .....668 lb.

Description: This cluster comprises two fagots of 79 bombs each. The bombs in each fagot are arranged nose-to-tail with their safety plungers inwards so that they are all depressed. The bombs are held in place by a front end plate and a rear end plate, a top beam and a bottom beam, four wooden slats, tensioning straps, and a retaining bar having lateral pins which engage tabs in the tensioning straps. A shear wire passes through a bridge and the retaining bar at a position near the end plate. A channel secured to the rear end plate supports a fuze adapter, the outer end of which is closed by a transit plug fitted with a leather washer. Inside the adapter is a piston through which is a pin arranged to engage the lower end of a pivoted lever. The fuze adapter and the piston are slotted to receive the lever. The upper end of the lever is forked and is connected to the retaining bar. The rear end plate has two dowels for locating the tail in position, and a nut welded to the center of the rear end plate to receive one end of a tail tie rod when the tail unit is fitted to the cluster. A nose cover is fitted to the front end plate to decrease the drag of the cluster.

Tail Construction: The Tail Unit No. 43 Mk I is a shortened drum-type tail, having a tail cone to which a tail strut is secured by fins. At the base of the tail cone are two holes designed to fit over the dowels on the rear end plate of the cluster. The tail unit is fitted with a bearing for an arming spindle so that, if it should ever be required to fuze the cluster with an air armed fuze, a suitable arming spindle with an arming vane could be readily fitted. Two windows, one of which is open, are provided in the tail cone. The open window is provided so that, when the cluster is prepared for use, the fuzing link connected to the pull-percussion mechanism of the Fuze No. 42 Mk IV can be passed through it and be connected to the fuzing unit of the bomb carrier.

Functioning: When a fuzed cluster projectile is released, the fuze functions, and, after a delay during which the cluster projectile falls freely, the fuze magazine charge is fired. The products of combustion of the magazine charge force the piston in the fuze adapter against the lower end of the pivoted lever, which is thus rocked about its pivot and exerts a pull on the retaining bar of the cluster. This causes the retaining bar to break its shear wire and to be moved so that the pins on the bar disengage the taps on the tensioning straps. The straps then fly outwards and the cluster disintegrates, the component parts falling away separately. The individual 4-lb. bombs function on impact.

Suspension: A British type suspension lug is fitted to the top beam, and tapped holes in the beam are provided for fitting American type lugs.

Cluster Projectile 1,000-lb. No. 16 Mk II (Service)

Data

Fuzing.....Nose Fuze No. 42 Mk IV
Color markings....Dull red over-all; one tensioning strap painted bright red
Contents.....Two hundred and thirty five 4-lb. incendiary bombs
Tail No. .....No. 48 Mks II and III
Over-all length.....73.5 in. (approx.)
Body diameter.....18 in. (approx.)
Total weight .....935 lb.

Description: This cluster consists of three fagots of 4-lb. incendiary bombs. The bombs in each fagot are arranged nose-to-tail with their safety plungers inward so that they are all depressed. The bombs are held in place by a front end plate, a rear end plate, a top and bottom beam, four wooden slats, tensioning straps, and a retaining bar. The retaining bar has a series of lateral pins which engage tabs on the tensioning straps. A shear wire passes through a bridge and the retaining bar at a position near the front end plate. A channel secured to rear end plate supports a fuze adapter, the outer end of which is closed by a transit plug fitted with a leather washer. Inside the adapter is a piston, through

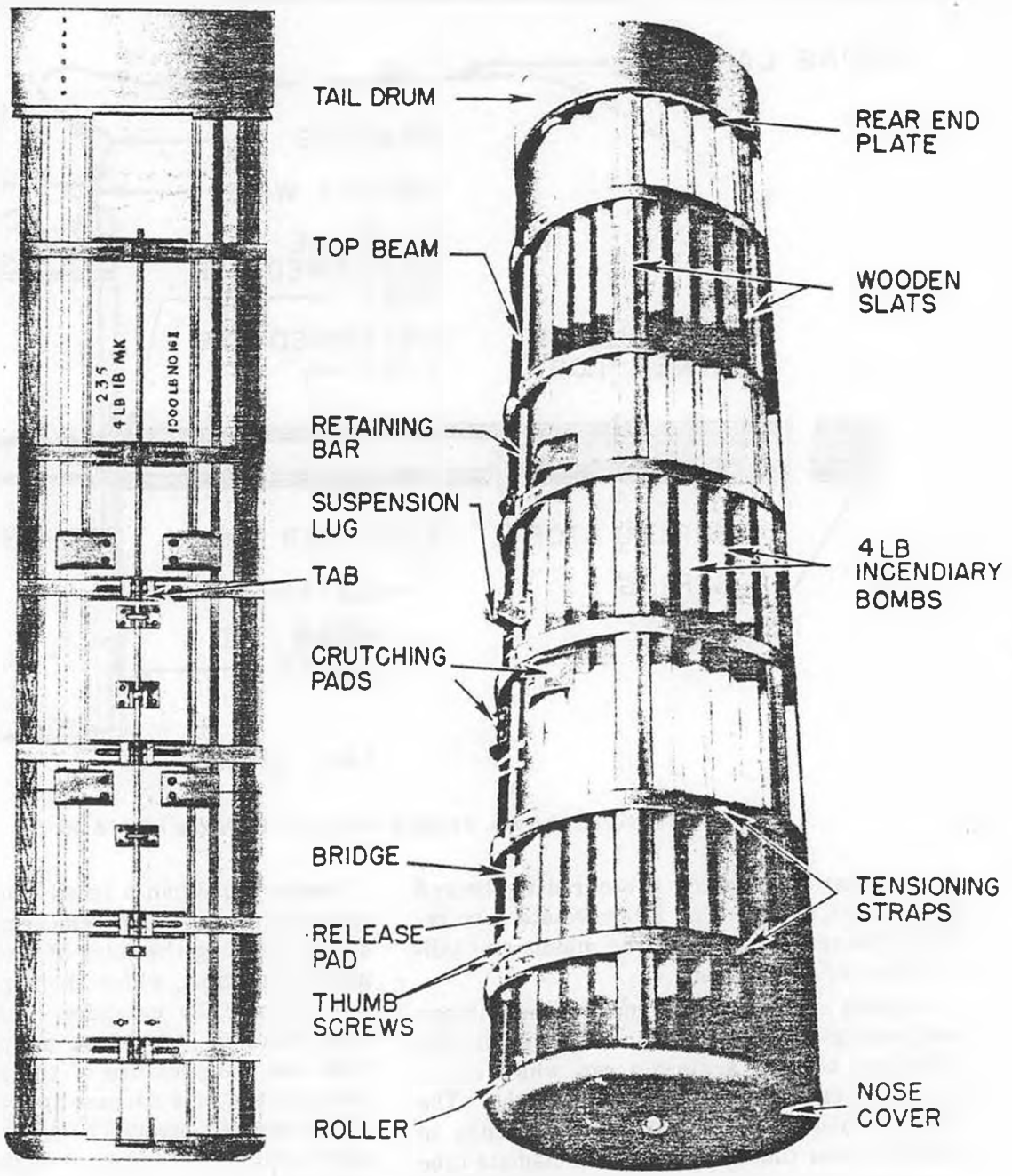


Figure 112—Cluster Projectile 1,000-lb. No. 16 Mk II

which a pin is passed, arranged to engage the lower end of a pivoted lever. The fuze adapter and the piston are slotted to receive the lever. The upper end of the lever is forked and is connected to the retaining bar. A nose cover is fitted to the front end plate to decrease the drag of the cluster. The tail unit is attached to a spring-loaded rod extending through the center of the cluster. The tail is held compressed against the spring by an arming wire arrangement.

Tail Construction: The Tail No. 48 Mk II and III is of the telescopic type and is supplied fitted to the cluster in the closed position. It consists of five fairings, forming a shortened cone, carried by the rear end plate of the cluster, and a strut mounted on supports, carried by an inner tube which slides in an intermediate tube. The intermediate tube extends through the whole length

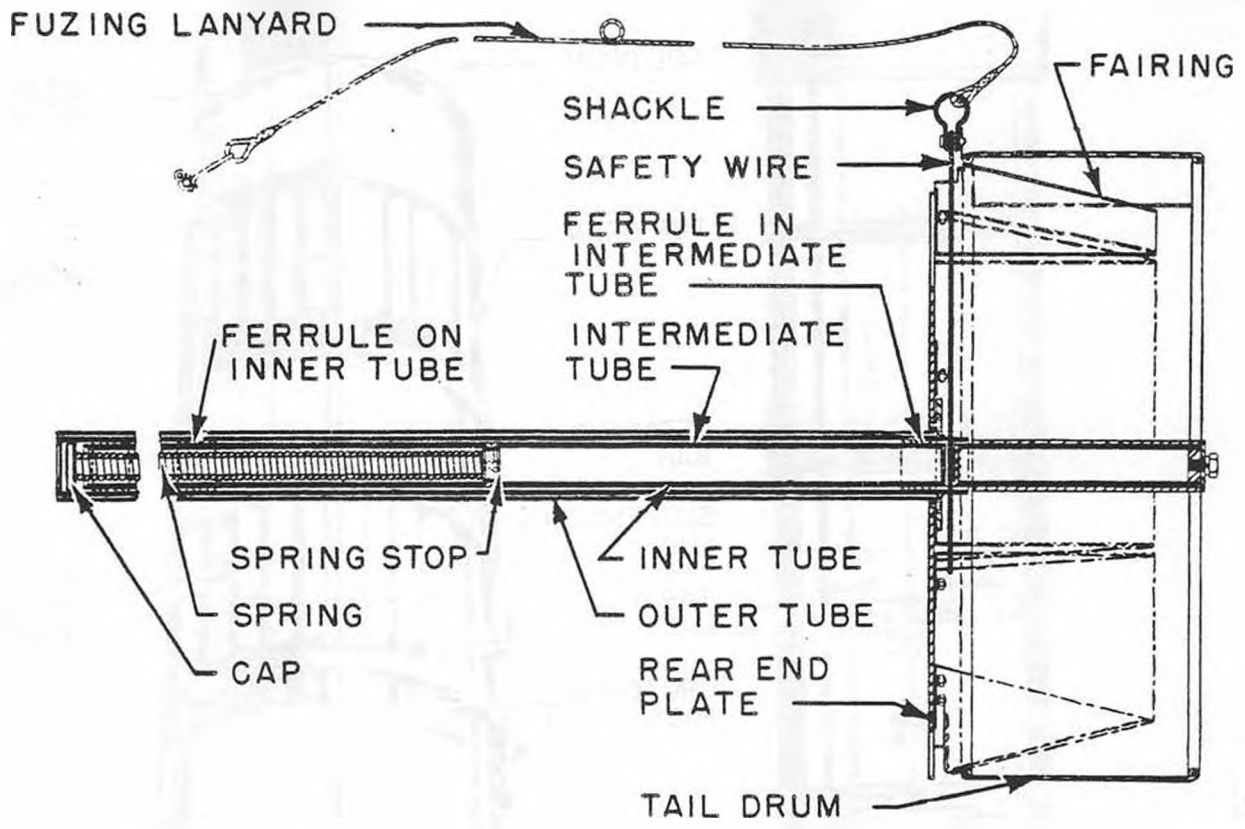


Figure 113—Tail Unit No. 48 Mk II for Cluster Projectile No. 16 Mk II

of the outer tube, which is secured to the end plate of the cluster. The intermediate tube replaces the central bomb of the middle and tail-end fagot of the cluster.

A spring is housed in the inner tube, with one end bearing against a stop in the tube and the other end bearing against a cap which closes the inner end of the intermediate tube. The spring, which is under compression, tends to slide the inner tube out of the intermediate tube to extend the tail. This movement is limited by a ferrule on the inner tube, which engages a ferrule in the intermediate tube when the tail is fully extended.

The inner and intermediate tubes have holes provided in them, which register when the tail is closed. A safety wire is threaded through the holes to retain the tail in its closed position against the action of the spring. A 4-ft. fuzing lanyard is attached to the eye of the safety wire by a shackle, and a similar shackle is provided at the free end of the lanyard.

Functioning: When a fuzed cluster projectile is released from the plane, the arming wire is withdrawn, starting the delay of the fuze and releasing the tail unit, which then springs out on its rod to the fully extended position. When the fuze functions, the fuze magazine charge is fired and the pressure of the gases forces the piston in the fuze adapter against the lower end of the pivoted lever. The lever is thus rocked about on its pivot and exerts a pull on the retaining bar of the cluster. This causes the retaining bar to break its shear wire and to be moved so that the pins on the bar disengage themselves from the tabs of the tensioning straps. The straps then fly outward, and the cluster disintegrates, scattering the bombs, which fall away separately. The individual incendiary bombs function on impact.

Suspension: A British type suspension lug is fitted to the top beam, and tapped holes in the beam are provided for fitting American type lugs.

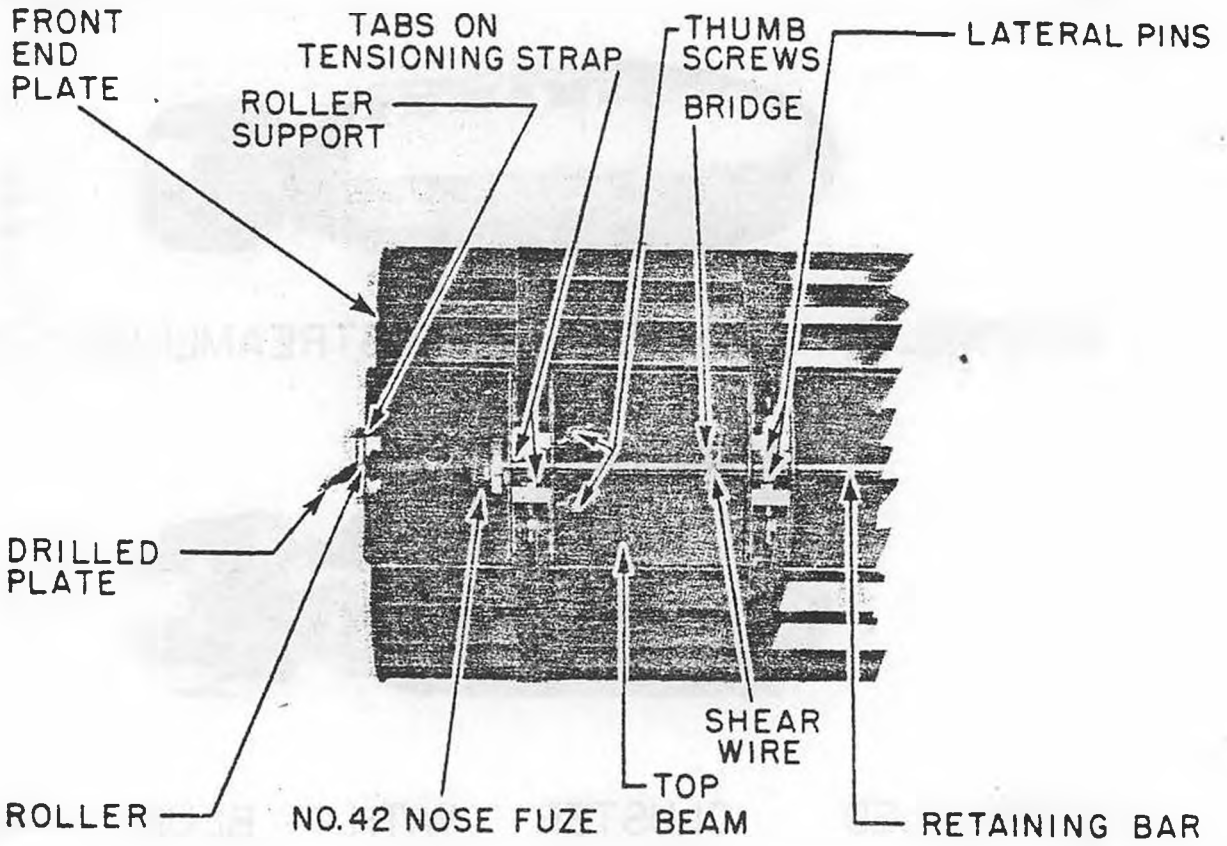


Figure 114—Nose assembly details of Cluster Projectile No. 16 Mk II

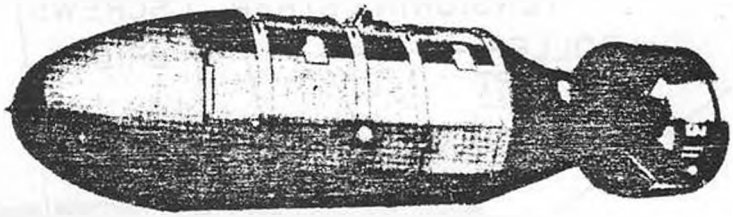
Remarks: The fagot at the nose end of the cluster contains 79 bombs. The central end tail fagot contains 78 bombs each, the central bomb of each of these fagots being removed to allow insertion of the outer tube, which accommodates the stem of the tail and is secured to the rear end plate of the cluster.

Cluster Projectile 500-lb. No. 17 Mk II (Service)

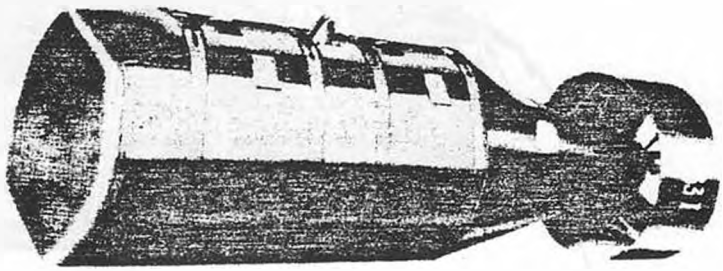
Data

Fuzing.....Tail Fuze No. 885 Mk I
Color markings.....Dark green over-all
Contents .....Twenty-six 20-lb. fragmentation bombs, specially designed for use in this cluster
Tail No. .....No. 63 Mks I and II
Over-all length.....63 in. (with blunt nose)
Width across flats.....15 in. (octagonal in shape)
Tail length .....27 in.
Total diameter .....17.5 in.
Total weight .....582 lb.

Description: The cluster comprises twenty-six 20-lb. fragmentation bombs arranged in two fagots of thirteen bombs each. The bombs are held in place by a front end plate and a rear end plate, a top beam and a bottom beam, side plates, which overlap each other, and tensioning straps and a retaining bar, which hold the components together. The bombs are completely enclosed. Lateral pins on the retaining bar engage tabs forming part of shoes attached to the ends of the tensioning straps. A shear wire passes through the retaining bar and a bridge on the top beam. A channel secured to the rear end plate supports a fuze adapter, the outer end of which is closed by a transit plug and leather washer. Inside the adapter is a piston through which is a pin to engage the lower end of a pivoted lever. The fuze adapter and piston are slotted to receive the lower end of the lever. The lever passes into the fuze adapter. Links connect the upper end of the lever to a downwardly projecting plate, welded to the retaining bar. The rear end plate has two dowels for locating the



ASSEMBLED CLUSTER WITH STREAMLINED NOSE



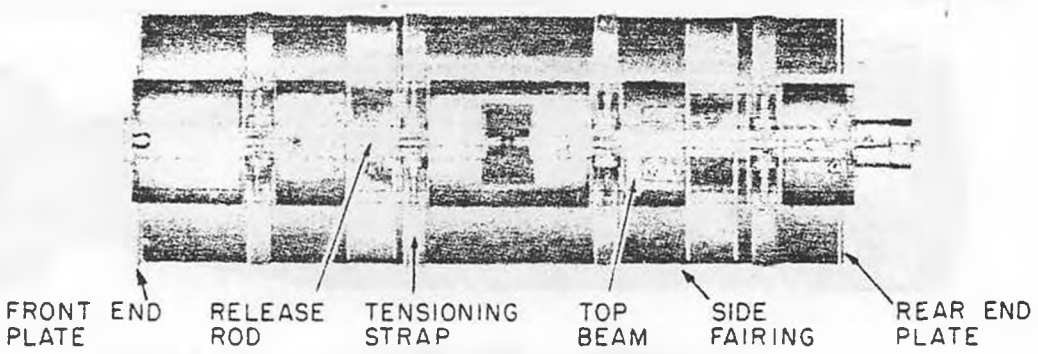
ASSEMBLED CLUSTER WITH BLUNT NOSE

Figure 115—Cluster Projectile 500-lb. No. 17 Mk II

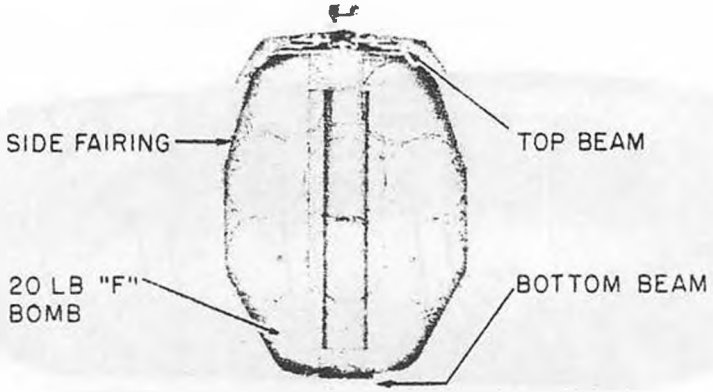
tail in position, and a nut welded to the center of the plate to receive one end of a tail tie rod, when the tail unit is fitted to the cluster. The front end plate has two dowels for locating either a blunt nose fairing or a streamlined nose fairing in position, and a nut welded to the center of the plate to receive the securing stud of the blunt nose fairing, or the tie rod of the streamlined fairing. The blunt nose fairing is fitted to the cluster if it is to be carried internally in an aircraft. The streamlined nose fairing consists of a hollow metal dome, the base of which is partly covered by an end plate welded to the dome, and is to be fitted to the cluster when carried externally on an aircraft.

Tail Construction: The Tail Unit No. 63 Mk I consists of a tail cone, having an approximately octagonal base and a tail strut secured to the cone by six supports. The tail unit has an arming spindle mounted in bearings, and has a fork at its inner end and an arming vane at its outer end. Two inspection windows in the tail cone are provided to enable the armorer to watch the fork of the arming spindle, when fitting the tail unit to a cluster fuzed with a Tail Fuze No. 855. The Tail No. 63 Mk I is only used when the cluster is carried internally in an aircraft. The Tail No. 63 Mk II is similar to the MK I, except that it is generally strengthened and has seven tail drum supports as compared with the six of the Tail No. 63 Mk I, and is to be used when the cluster is carried externally on the aircraft.

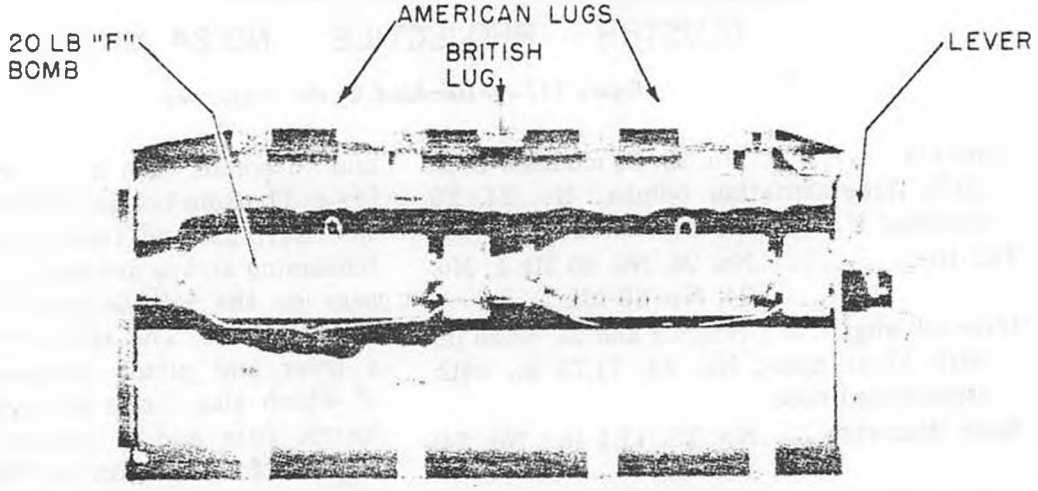
Functioning: When the fuzed cluster projectile is released, the fuze functions, and, after a period of delay during which the cluster falls freely, the fuze magazine is fired. The products of combustion of the magazin charge force the piston in the fuze adapter against the lower end of the pivoted lever, which is thus rocked about its pivot and exerts a pull on the retaining bar of the cluster. The pull breaks the shear wire passing through the retaining bar and moves the bar so that its pins disengage the tabs on the tensioning straps. The straps then fly outwards and the cluster disintegrates. Its component parts fall away separately and the individual



ASSEMBLY DETAILS



AXIAL FILLING ARRANGEMENT



LONGITUDINAL FILLING ARRANGEMENT

Figure 116—Cluster Projectile 500-lb. No. 24 Mk I

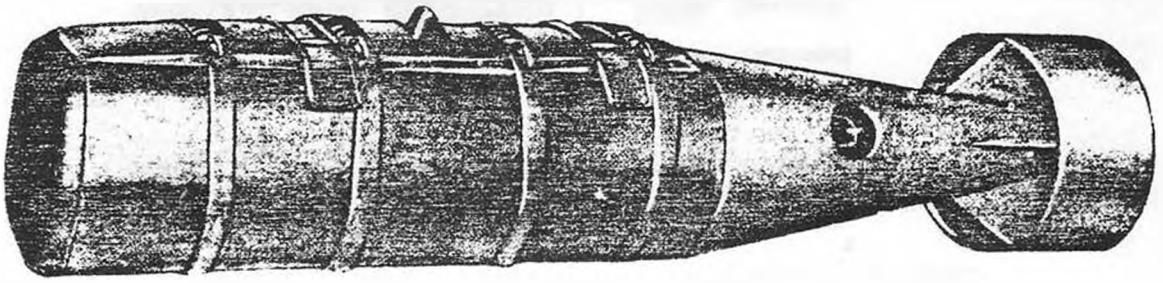
bombs descend, supported by their parachute, to function in the normal manner.

Suspension: A British type suspension lug is fitted to the top beam, and tapped holes in the top beam are provided for fitting American type lugs.

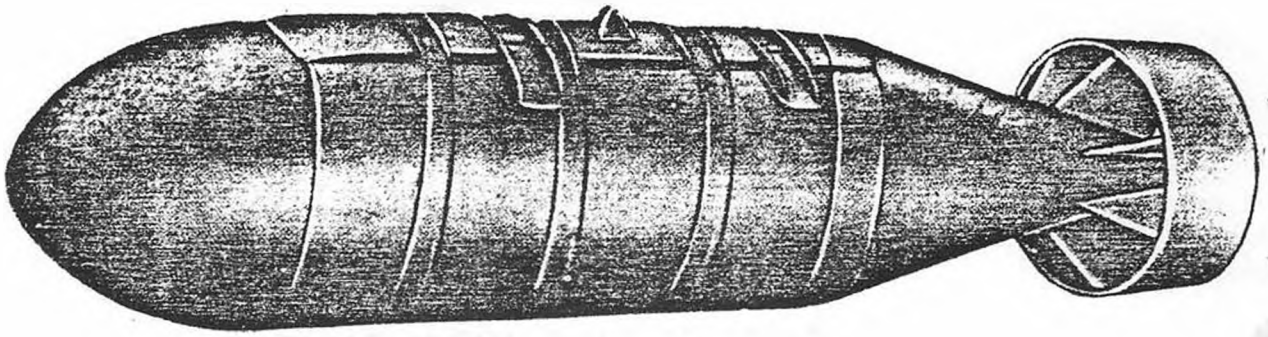
Cluster Projectile 350-lb. No. 23 Mk I, and 500-lb. No. 24 Mk I (Service)

Data

Fuzing .....Tail Fuze No. 885 Mk I
Color markings .....Dark green over-all; one tensioning strap painted red



CLUSTER PROJECTILE NO. 23 MK I



CLUSTER PROJECTILE NO. 24 MK I

Figure 117—Assembled Cluster Projectiles

Contents .....No. 23, 14 modified U. S. 20-lb. fragmentation bombs; No. 24, 20 modified U. S. 20-lb. fragmentation bombs
Tail No. .....No. 23, No. 65 Mk I; No. 24, No. 66 Mk I
Over-all length.....Nos. 23 and 24, 62.25 in. with blunt nose; No. 24, 71.75 in. with streamlined nose
Body diameter ....No. 23, 11.1 in.; No. 24, 14.5 in.
Tail length .....No. 23, 27.5 in.; No. 24, 30.5 in.
Tail diameter .....No. 23, 12.6 in.; No. 24, 18.0 in.
Total weight ..No. 23, 335 lb., No. 24, 467 lb.

Description: These clusters are identical in construction, and function in a similar manner. The Cluster No. 23 Mk I, however, is approximately hexagonal in cross-section, while the No. 24 Mk I is roughly octagonal.

The bombs forming the cluster are retained in two fagots of 7 bombs each in the No. 23 and 10 bombs each in the No. 24 by means of top and bottom beams, front and rear end plates, side fairings, and four tensioning straps. The tensioning straps are held in position by lateral pegs on the release rod, which is carried on the top beam. The release rod is connected to a lever and piston mechanism, the cylinder of which also forms an adapter for the barometric fuze and is located on the rear end plate. Before the fuze is fitted, the adapter is closed by a washered plug.

The cluster is converted into an aimable cluster by the addition of a blunt nose fairing and a drum-type tail. A special streamlined nose fairing is designed only for the Cluster No. 24 Mk I, when it is to be stowed externally on the aircraft.

Tail Construction: The Tail Unit No. 66 Mk I of the Cluster No. 24 consists of a tail cone having an approximately octagonal base to which a circular strut is attached by seven tail fins. The cone is fitted with the conventional arming assembly consisting of arming vanes,

arming spindle, and an arming fork. The tail is fastened to the cluster by a tie rod, and has two dowel holes in its base to position it. The cone is fitted with two inspection windows.

The Tail Unit No. 65 Mk I is similar to the No. 66 Mk I except that it has a hexagonal base, and only six tail pins.

Functioning: On release from the aircraft, the cluster falls until the fuze functions. The explosion in the magazine forces the piston forward in its housing and causes a rocking movement of the pivoted lever. The sudden movement of the lever exerts a pull on the retaining bar and breaks the shear wire, disengaging the lateral pins from the tabs of the tensioning straps. The straps are thus released and fly outwards, releasing the bombs.

Suspension: A British type suspension lug is fitted to the top beam, and two crutching pads bolted to the beam are used when a British type bomb carrier is fitted to the cluster. Two sets of four tapped holes are provided in the top beam for the attachment of American type suspension lugs. Two of the four holes at the nose end of the beam normally house the bolts securing one of the crutching pads to the beam. If American type lugs are fitted, the British type lug and crutching pads must first be removed.

Nose Ejection Clusters

General Information: Experts have long strived to obtain a better type of cluster projectile, because of the inherent problems of aiming accuracy, dispersion of contents, weight factor, etc., presented by this type of ordnance. The British believe that the solution to the search lies in the use of the Nose Ejection type cluster described herein, or its successor as modified by further research.

Nose ejection clusters were put into production near the end of World War II. The information presented here is a generalized summary of nose ejection clusters, due to the fact that many of the individual clusters of this type are still in the developmental stage.

General Requirements: The fundamental requirement of any cluster is to provide a means of placing cluster contents effectively on the target, the effectiveness being regarded broadly as a function of the angle and velocity of strike, functioning of fuzes or strikers, density of pattern, and accuracy of aim. Complementary requirements of equal importance are that the cluster shall provide an economical aircraft bomb load, that its preparation for use shall be simple and speedy, that it will withstand road, rail, and ship transport without endangering its safety or usefulness, and that it will meet the strength requirements specified for carriage of bombs in British and American aircraft.

The type of nose ejection cluster now being developed and in production goes far towards meeting these requirements in a simple and direct manner. It is not possible to generalize on the stability of nose ejection clusters as a group, since this depends on weight and dimensional characteristics, which are mainly due to the type of cluster contents carried. Ballistic stability resulting in an aiming error of between 2 and 6 mils is being obtained, and will be improved upon as the development of folding and telescopic tails progresses.

The effectiveness of cluster contents from nose ejection clusters is largely fortuitous. It appears to depend mainly on the inherent stability of the cluster contents and the parent cluster, although the velocity and height of disintegration of the cluster has some bearing. Control of cluster velocity at disintegration is a problem now being explored. Earlier investigation showed that decreased velocity at disintegration is invariably accompanied by a closing in of the scatter pattern, and much work on the control of the scatter pattern remains to be done.

Increasing the size of scatter patterns by means of attachments to the cluster contents and asymmetric parasheets is being investigated, but the results so far obtained, though promising, do not justify immediate embodiment.

Body Construction: The cluster body consists of a cylindrical steel shell made from 10- or 12-gauge steel plate, and is closed at the rear end by a steel plate of similar gauge, which is welded in position. Two fuze pockets, which are deep enough to accommodate the burster ejectors, are attached to the end plate, which also embodies a centrally tapped hole for attaching the cluster tail. A test plug, by which air pressure is applied at the filling factory to check that the rubber

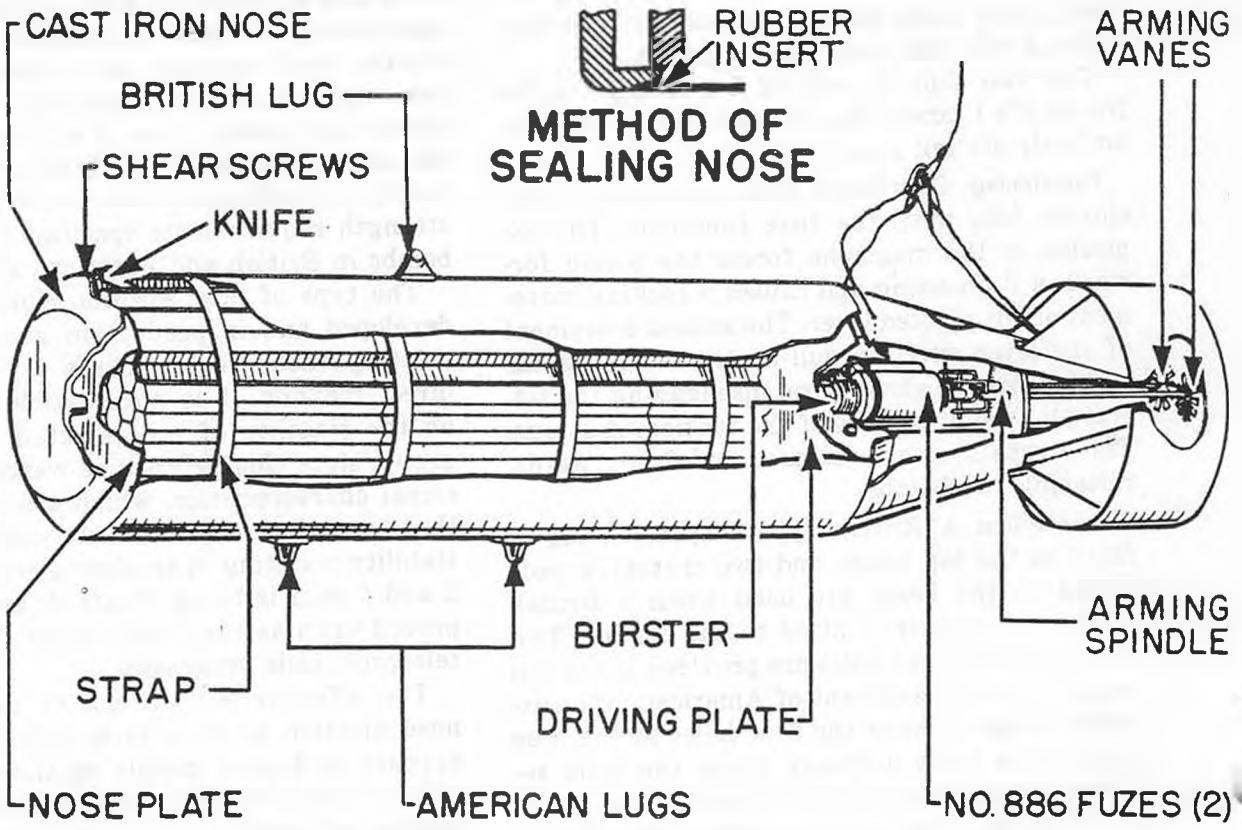


Figure 118—Typical Nose Ejection Cluster

sealing joints in the nose are properly tight, is also provided in this plate. The end plate is shaped to form a shallow truncated cone, the sloping surface of which locates the tail centrally on the cluster body. The nose end of the cluster is closed by an iron casting secured in place by a number of screws. On the inside of the casting is an internal steel squash plate secured by a central screw. Its purpose is to compress the rubber sealing ring against the internal surface of the cluster body to exclude air. A knife is attached at the front end of the cluster for the purpose of cutting the steel straps as the fagot of cluster contents is ejected. A pressure plate is assembled in the cluster behind the fagot of cluster contents. Suspension lugs for British and American type bomb stowage are permanently attached to the cluster body.

The cluster is designed, manufactured, and tested to withstand the climatic conditions experienced in the Far East. After assembly at the filling factory, the rubber sealing joints in the nose and under the knife fixing screws are tested for tightness by an air-pressure test.

Tail Construction: Two types of cluster tail are in use, the conventional type with a tail cone and cylindrical strut, and one having collapsible fins, which is used where the space available is too small to permit the use of a normal-type tail. Twin arming mechanisms are locked by means of fuzing wires engaging holes in the arming vanes. Windows are provided through which the fuze can be observed as the tail is assembled to the cluster. The tail is located on the tapered end plate of the cluster body, and is secured by a single central bolt. It is designed, manufactured, and boxed for use in tropical climates.

Transit Bases: To prevent the cluster from sustaining damage affecting the safety of its contents, or destroying the hermetic seal in the nose, each cluster is fitted with transit bases which are intended to remain in position until the cluster is prepared for use.

The transit bases consist of two light-gauge steel rings filled with a material designed to withstand shock loads resulting from rough

handling, and also to distribute the load over a large area of the cluster and so prevent damage to the nose seal, which would inevitably result from a blow concentrated at any one point on the nose cover. The material used in the Mk I design is a resin-bonded sawdust, which is light in weight and resistant to tropical climatic conditions, fungi and insect growth, etc. The bases are fitted one at each end of the cluster, and secured by tie rods, which embody a quick release device designed to enable the bases to be removed in a minimum of time.

Fuzing: One fuze and burster only are necessary to disintegrate the cluster, but two of each are used as an insurance against complete failure. Clusters containing 4-lb. I.B.'s are fuzed with two Tail Fuzes No. 42 Mk IV, while all others use two Barometric Tail Fuzes No. 886.

Burster Ejectors: Ejection of the cluster contents in effected by a burster ejector, which is ignited by the cluster fuze. The bursters are placed in the cluster at the time of fuzing. There are two types of burster, the No. 6 Mk I containing 70 grms. of G. 20 powder for large clusters, and the No. 7 Mk I containing 50 grms. of G. 20 powder for the smaller clusters. The powder is contained in a plastic cylinder manufactured from a polyvinal chloride. This material is fully resistant to tropical conditions and does not affect the gunpowder. The cylinders are provided with two small extrusions by which they can be removed from the cluster if required.

For transport and storage the bursters are packed two or four (according to size) in a sealed metal cylinder, 18 of which are packed in one wooden box. The metal cylinders are opened by means of a tear-off metal strip.

Contents: The cluster contents are assembled in two or more banks of bombs, with light-gauge steel end plates and longitudinal steel struts, to form a fagot, which is firmly secured by a number of circumferential steel straps. When properly assembled to a fagot, the cluster contents are safe and the fuzes cannot arm accidentally. Damage to components of the cluster contents by the force of the ejector charge is prevented by the steel struts, which transmit the force of the explosion from the pressure plate directly to the nose cover, and not through the bombs themselves.

Functioning: On release from the aircraft, the fuzing lanyards are withdrawn from the fuzes and from the air arming vanes. When a folding tail is used, the lanyard is also withdrawn from the retaining device to allow the tail to assume an expanded position. At a predetermined height the fuzes operate and ignite the burster. The expanding gases from the burster drive the fagot of contents forward. As the fagot passes the cutting edge of the knife, the steel straps binding the cluster are severed, and the screws holding the cluster noose in place are broken. The contents are then fully ejected.

Developmental Priority: The following is a list of nose ejection clusters in order of their development priority. The first six items were cleared for production on 7 July, 1945.

Cluster N. E., ANM 69 I.B., 600-lb. Mks I & II
Cluster N. E., 18-lb. Mg. I.B., 800-lb. Mk I
Cluster N. E., J. 20-lb. I.B., 800-lb. Mk I
Cluster N. E., ANM 40 H.E., 600-lb. Mk I
Cluster N. E., ANM 40 H.E., 350-lb. Mk I
Cluster N. E., F. 8-lb. H.E., 550-lb. Mk I
Cluster N. E., F. 8-lb. H.E., 350-lb. Mk I
Cluster N. E., F. 8-lb. H.E., 1,000-lb. Mk I
Cluster N. E., ANM 69 I.B., 550-lb. Mk III
Cluster N. E., 4-lb. I.B., 800-lb. Mk I
Cluster N. E., J. 30-lb. I.B., 500-lb. Mk I
Cluster N. E., 4-lb. I.B., 500-lb. Mk I
Cluster N. E., 4-lb. I.B., 950-lb. Mk I
Cluster N. E., ANM 69 I.B., 1,000-lb. Mk I
Cluster N. E., 3-lb. I.B. 1,000-lb. Mk I

DETAILS OF NOSE

Cluster Designation	Child Stores No.	Child Stores Type	Child Stores Fuze
Cluster N.E., ANM 69, 600-lb. Mk I	62	ANM 69 I.B.	Striker Unit
Cluster N.E., ANM 69, 600-lb. Mk II	62	ANM 69 I.B.	Striker Unit
Cluster N.E., ANM 69, 600-lb. Mk III	54	ANM 69 I.B.	Striker Unit
Cluster N.E., ANM 69, 1,000-lb. Mk I	91	ANM 69 I.B.	Striker Unit
Cluster N.E., 18-lb. Mg. I.B., 800-lb. Mk I	28	18-lb. Mg. I.B.	873 Mod.
Cluster N.E., J. 20-lb. I.B., 800-lb. Mk I	28	J. 20-lb. I.B.	888
Cluster N.E., 4-lb. I.B., 800-lb. Mk I	170	4-lb. I.B.	Striker Unit
Cluster N.E., 4-lb. I.B., 500-lb. Mk I	110	4-lb. I.B.	Striker Unit
Cluster N.E., 4-lb. I.B. 950-lb. Mk I	219	4-lb. I.B.	Striker Unit
Cluster N.E., J. 30-lb. I.B., 500-lb. Mk I	14	J. 30-lb. I.B.	Striker Unit
Cluster N.E., 3-lb. I.B., 1,000-lb. Mk I	255	3-lb. Mg. I.B.	Striker Unit
Cluster N.E., ANM 40 H.E., 600-lb. Mk I	20	ANM 40 Para. Att. No. 14	ANM 104 or 120
Cluster N.E., ANM 40 H.E., 350-lb. Mk I	14	ANM 40 Para. Att. No. 14	ANM 104 or 120
Cluster N.E., F. 8-lb. H.E., 550-lb. Mk I	49	F. 8-lb. Para. Att. No. 12 Mk II	880 Mk IV or 881
Cluster N.E., F. 8-lb. H.E., 350-lb. Mk I	21	F. 8-lb. Para. Att. No. 12 Mk II	880 Mk IV or 881
Cluster N.E., F. 8-lb. H.E., 1,000-lb. Mk I	88	F. 8-lb. Para. Att. No. 12 Mk 11	880 Mk IV or 881

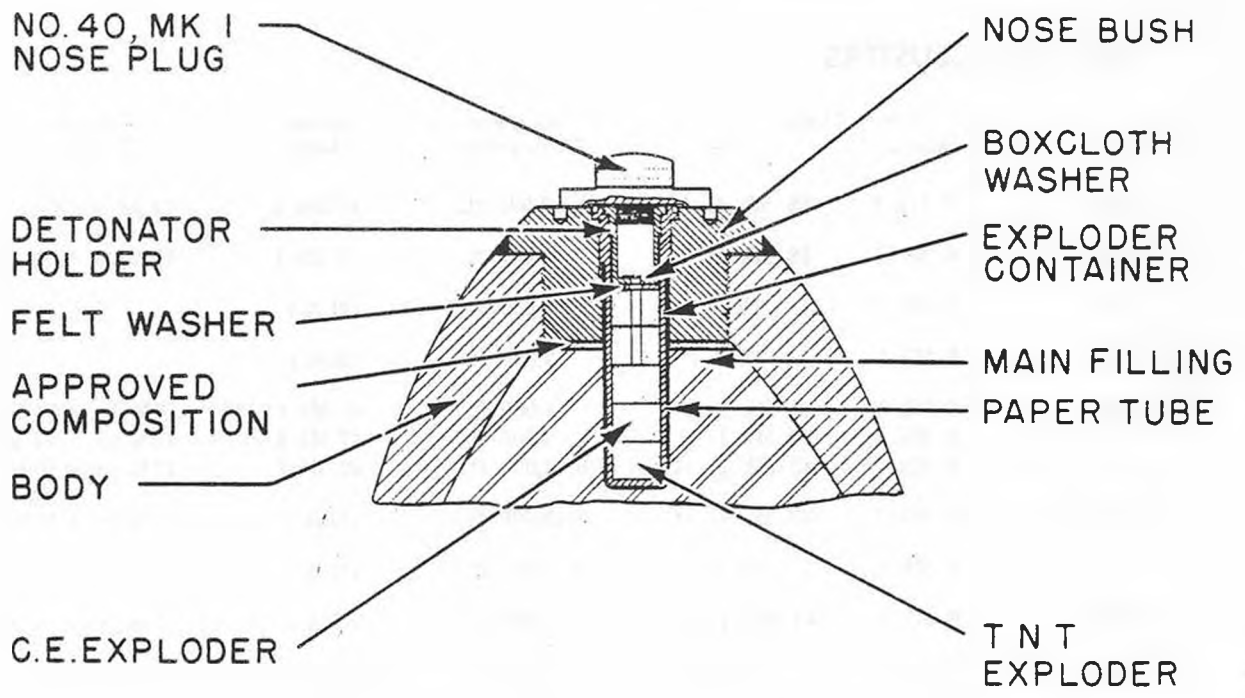
LEGEND

(C)—Conventional cone and strut tail. (N.A.)—Not Allotted.
(F)—Folding or retractable fin tail. (S) —Single cluster fuze.

EJECTION CLUSTERS

Fuze	Parent Cluster Burster	Parent Cluster Tail	[1]Height of Disintegration	Transit Base	Cluster Dimensions
886(S)	6 Mk I	58 Mk II (C)	3,000 ft.	40 Mk I	19 in. x 68½ in.
886	6 Mk I	58 Mk II (C)	3,000 ft.	40 Mk I	19 in. x 68½ in.
886	6 Mk I	(N.A.)	3,000 ft.	(N.A.)	
886	6 Mk I	(N.A.)	3,000 ft.	(N.A.)	
886	6 Mk I	87 Mk I (F)	4,000 ft.	47 Mk I	16¾ in. x 74 in.
886	6 Mk I	87 Mk I (F)	4,000 ft.	47 Mk I	16¾ in. x 74 in.
42 Mk IV	6 Mk I	43 Mk II (C)	8-13,000 ft.	49 Mk I	17¾ in. x 67½ in.
42 Mk IV	6 Mk I	42 Mk II (C)	8-13,000 ft.	(N.A.)	14½ in. x 67½ in.
42 Mk IV	6 Mk I	(N.A.)	8,13,000 ft.	(N.A.)	
886	6 Mk I	44 Mk II (C)	3,000 ft.	(N.A.)	17 in. x 69 ½ in.
886	6 Mk I	(N.A.)	3,000 ft.	(N.A.)	
886	6 Mk I	46 Mk III (C)	3,000 ft.	46 Mk I	15½ in. x 61 in.
886	7 Mk I	65 Mk II (C)	3,000 ft.	45 Mk I	11¾ in. x 59 in.
886	6 Mk I	46 Mk III (C)	3,000 ft.	44 Mk I	15½ in. x 57½ in.
886	7 Mk I	68 Mk I (C)	3,000 ft.		11½ in. x 57 in.
886	6 Mk I	50 Mk I (F)	3,000 ft.	48 Mk I	17¼ in. x 72 in.

[1]NOTE: The height of disintegration shown as 3,000 ft. is a nominal figure, and may be increased to obtain improved effectiveness of cluster contents.



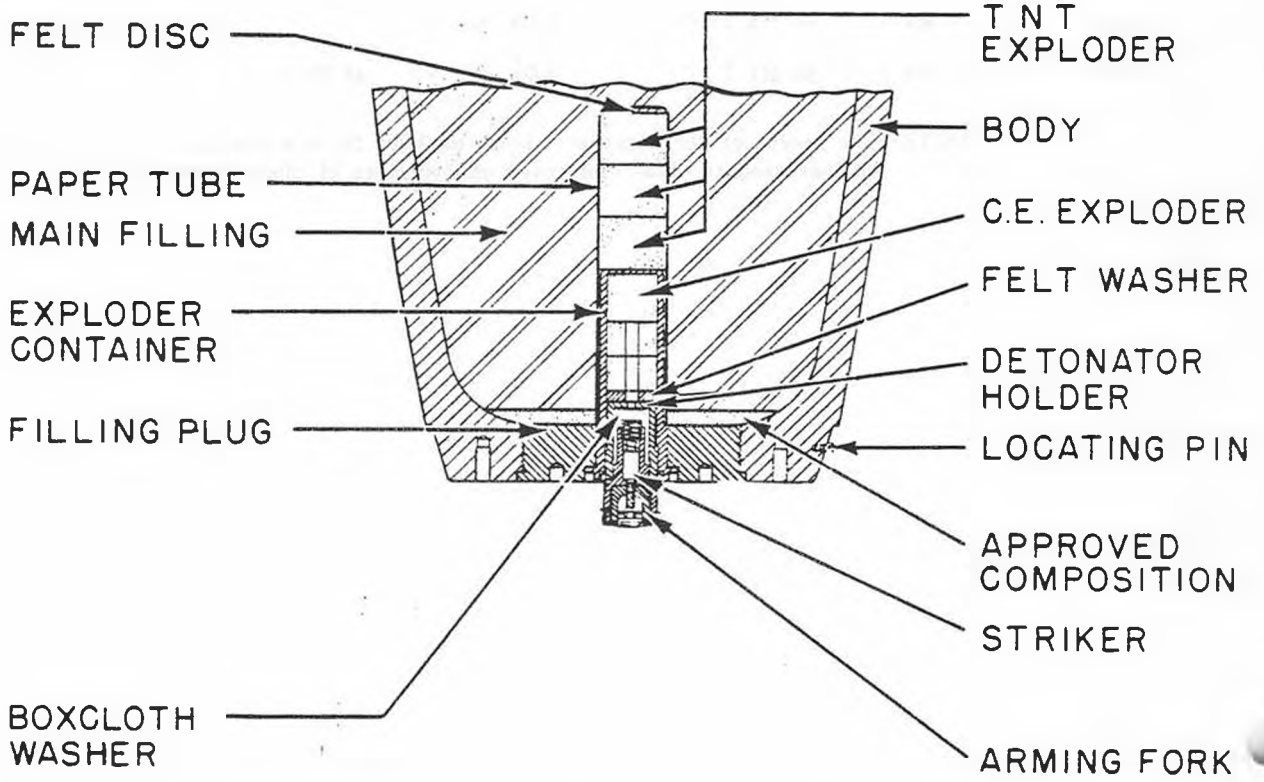


Figure 119—Typical fuzing arrangement for bombs over 500 lb.

Part 2—PISTOLS, FUZES, AND DETONATORS

Chapter I

INTRODUCTION

General

Part 2 of this publication is concerned with the devices used to initiate British aircraft bombs and pyrotechnics. Included in this section are all British pistols and fuzes currently in service use. In addition, obsolescent pistols and fuzes, which are no longer in manufacture, but stocks of which are still available for use, are also presented, as are certain pistols and fuzes which have been declared obsolete, but are included because of their former importance, or as a matter of interest. More important obsolete items, such as the Fuze No. 845, are presented in the main body of this section. Other less important obsolete items are included in chart form.

A separate chapter summarizes the information on detonators.

Classification

Initiating devices for British bombs are divided into two distinct groups, pistols and fuzes. The term pistol is used to describe an initiating device which contains no explosive components (primer, detonator, or booster) as it is normally shipped or issued. A pistol is purely a mechanical device, embodying certain arming and safety features for initiating explosive components which are inserted in the bomb as a separate entity. These separate explosive components used with pistols are termed detonators. Initiating devices which do contain explosive components as integral parts, however, are termed fuzes. Generally, in addition to a primer-detonator combination, fuzes are also fitted with burster charges, or boosters.

As a general rule, British pistols are used to initiate high-explosive bombs, while British fuzes are employed in miscellaneous types of missiles, such as smoke bombs, flares, etc. However, many exceptions will be found to this rule.

Designation

British fuzes and pistols are designated by a number and a mark. The number corresponds to the U. S. "Mark" designation, and the mark (always expressed in Roman numerals) is equivalent to the U. S. "Modification." Since some British pistols carry the same number and mark designations as a British fuze, the name "Pistol" or "Fuze" must always accompany the number and mark designation, as: Pistol No. 38 Mk I, Fuze No. 38 Mk I, etc. Minor changes in marks are indicated by asterisks, capital letters, or lower-case letters. Although the fuze or pistol designation is almost invariably stamped or stencilled on the external surface of the fuze or pistol, in many cases this designation is not visible when the fuze or pistol is inserted in the bomb. Besides the number and mark designation, other information, such as the date of manufacture and the manufacturer's initials or symbol, are stamped or stencilled on the fuze or pistol.

Detonators are also designated by number and mark, and have this designation, as well as the delay time and date of manufacture, printed on a paper washer, which is glued to the detonator head.

Securing Devices

A novel type of device is employed by the British to secure their pistols and fuzes in bombs. This device consists of a spring clip or "tab locking device" fitting around the base of the pistol. The clip is attached to the pistol or fuze body by a series of dents which fit into cavities located around the body. A small tab, about ¼ in. long, projects below the clip. When the pistol or fuze is screwed into the bomb, the tab engages one of a series of small holes drilled around the top of the exploder container. This prevents the clip from moving around with the

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pistol and provides a ratchet effect on the pistol body. This device prevents the pistol or fuze from working loose while in the plane, and yet leaves it only hand-tight in the bomb, so that it may be easily removed.

A beveled spring washer and a solid locking ring are two other devices used to hold pistols and fuzes in place in the bomb.

Detonators are held in place in the bomb or detonator holder by the pistol, which fits over them.

Fuzing Arrangement

Most British bombs are equipped for both nose and tail fuzing, and occasionally dual fuzing is used. However, it is the more common practice for British armorers to fuze the bombs in either the nose or the tail, using only one fuze. Generally, if a delay is desired, the bomb is fuzed in the tail, while nose pistols or fuzes will be used for instantaneous action.

In most instances, fuzes and pistols are designed so that they may be dropped safe by leaving some form of safety device (safety fork, safety pin, or safety clip) in place. Certain fuzes and pistols, however, may not be dropped safe, because of the absence of safety devices or the automatic removal of such devices when the bomb is released.

Tail fuzes normally have arming vanes as an integral part of the fuze mechanism. Tail pistols, on the other hand, generally are armed by an arming fork, which engages a similar fork on the reach rod attached to the arming vanes. This arming assembly is incorporated as an integral part of the standard British tail unit.

In most bombs of 500-lb. and under in weight, fuzes cannot be used. Pistols are screwed directly into an exploder container, which contains a detonator and booster pellets. In bombs weighing over 500-lb., the pistol is screwed into a detonator holder, which, in turn, is threaded into the exploder container of the bomb. In this size bomb, if a fuze is to be used, the detonator holder is omitted, and the fuze is screwed directly into the exploder container.

A discussion of the detonators used with British pistols will be found in chapter 4. Relatively insensitive anvil-type detonators are employed with pistols which have blunt strikers. Sensitive "capsule" detonators are used with pistols containing needle-pointed strikers.

Figure 119 shows the typical fuzing arrangement for a bomb of more than 500 lb. in weight.

Part 2—Chapter 2

PISTOLS

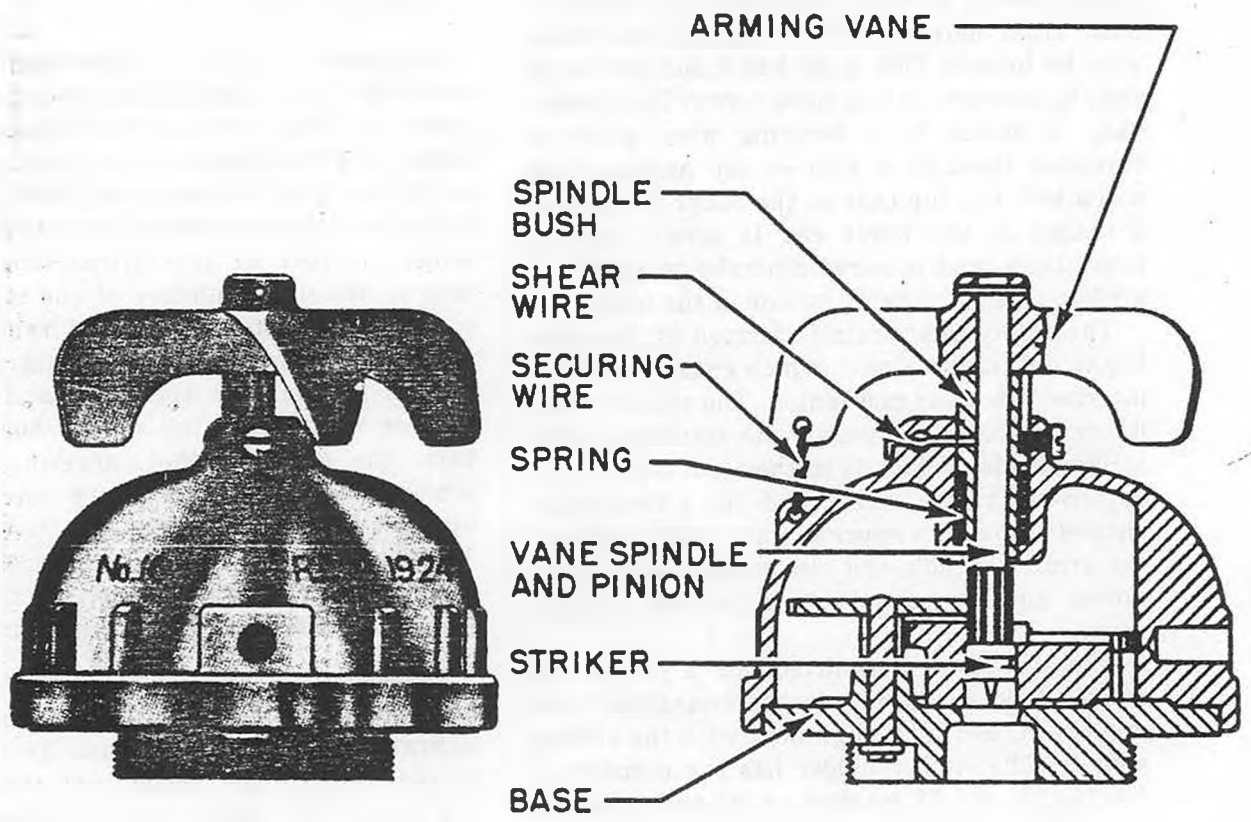

Figure 120—Nose Pistol No. 16 Mk I

Introduction

A pistol is a mechanical device, which contains no explosive components and embodies certain arming and safety features, whose main function is to initiate the explosive system of the bomb in which it is used.

This chapter includes information on nose pistols, tail pistols, pistols which can be used in either nose or tail pockets, side-pocket or athwartships pistols, and depth-charge pistols. It includes examples of inertia impact, direct impact, chemical delay, anti-withdrawal, aerial burst, and hydrostatic action pistols.

For further information on pistols see the Introduction to Part 2.

Nose Pistol No. 16 (Obsolete) and No. 16 Mk I (Obsolescent)

Data

Bombs used in.....H.E. 20-lb. Mk I
Action.....Instantaneous on impact
Armed condition.....When striker can be seen through central hole in base of fuze
Fuzes used with.....None
Arming time.....From 5 to 25 vane revolutions depending on setting
Vane span.....3.1 in. (5 vanes)
Body diameter .....3.3 in.
Over-all length.....3.3 in. (less booster)

Description: The body is a hollow, dome-shaped casting, recessed at the bottom to take the base, which is secured to the body by three screws. The top of the body has a boss bored to take an arming-spindle bush, which houses an arming spindle and pinion. Located between a shoulder in the bore of the boss and a shoulder on the bush is a spring, which tends to keep the bush from moving inwards should the shear wire be broken. The bush has a slot cut in its side, to accommodate a guide screw. The arming vane is locked by a securing wire, which is threaded through a hole in the arming vane and a hole in a lug cast on the body. The base is threaded at the lower end to screw into the bomb body, and is bored centrally to allow the striker access to the detonator in the bomb.

The safety gear train is formed by the arming spindle and a pinion, which engages with an intermediate gear and pinion. The pinion of the intermediate gear engages with teeth cut on the striker holder, which is in the form of an interrupted-tooth gear wheel, and has a triangular-shaped stop on its upper surface which contacts the arming spindle and pinion after a predetermined number of revolutions of the arming vane.

The striker is press-fitted into a hole in the striker holder adjacent to the triangular stop, and the striker is in alignment with the arming spindle. The striker holder has the numbers 5, 10, 15, 20, and 25 marked on its under side on the same pitch circle as the hole which houses the striker. When any one of these numbers is opposite the central hole in the base, approximately that number of revolutions of the arming vane will be required to bring the striker opposite the central hole in the base. The normal setting is 25. The striker holder rotates on a striker holder pin, which is riveted to the base of the pistol. The striker holder is retained on the pin by a split pin.

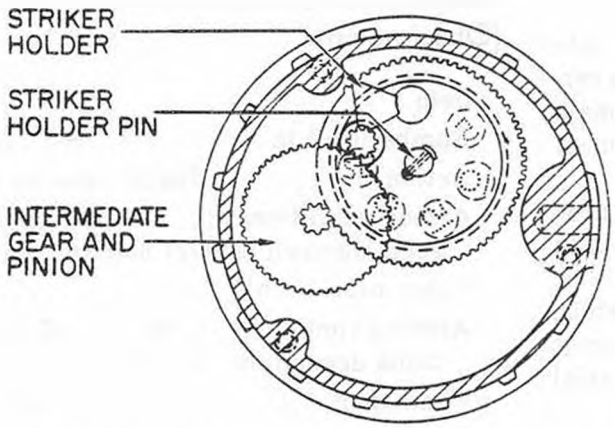

Figure 121—Safety gear train of Nose Pistol No. 16 Mk I

Operation: On release of the bomb, the vanes rotate and act through the arming spindle and pinion to rotate the intermediate gear and its pinion in a counterclockwise direction. The pinion on the intermediate gear rotates the striker holder in a clockwise direction. After a predetermined number of revolutions, the triangular stop on the upper surface of the striker holder comes into contact with the arming spindle pinion, aligning the striker with the arming spindle and hole in the base, and preventing further rotation of the striker holder. On impact, the arming vanes, arming spindle and pinion, and spindle bush are forced inwards against the spring, breaking the shear wire. The inner end of the arming spindle and pinion forces the striker into contact with the percussion cap of the detonator in the bomb.

Remarks: If the pistol is not in the bomb, visual inspection through the hole in the base will indicate the number of vane revolutions required to align the striker with the pinion and the hole in the base, since the numbers 5, 10, 15, 20, and 25 are marked on the bottom of the striker holder and are visible when opposite the hole in the base.

The Pistol No. 16 Mk I was formerly designated as the Pistol No. 7 Mk I.

Tail Pistol No. 17 Mks I-III (Obsolescent)

Data

Bombs used in....G.P., 250-lb. Mks I, II, III, and V, and G.P., 500-lb. Mks I, II, III, and V

Action.....Chemical delay of from ½ to 36 hours; A/W if dropped

Armed condition.....No external evidence of arming

Fuzes used with.....Nor

Arming time.....8 vane revolutions

Vane span .....4.6 in.

Body diameter .....1⅛ in.

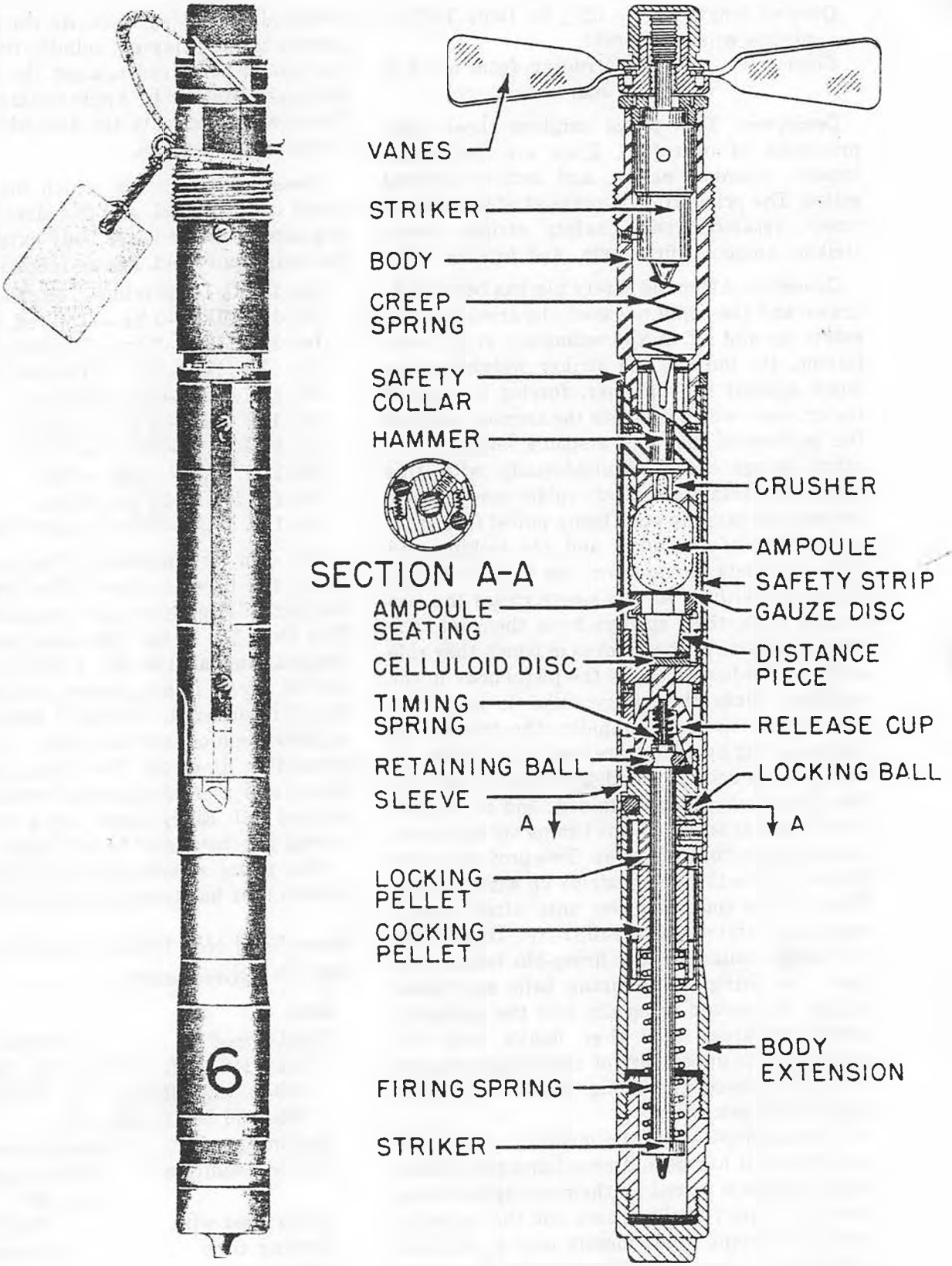

Figure 122—Tail Pistol No. 17 Mk I

Over-all length .....12¾ in. (only 1.67 in. visible when in bomb)
Color.....Part protruding from bomb is painted red.

Description: This pistol employs three basic principles of operation. They are mechanical impact, chemical action, and anti-withdrawal action. The principal parts consist of the arming vanes, retaining balls, safety strips, sleeve, striker, ampoule, firing pin, and locking balls.

Operation: After the safety pin has been withdrawn and the bomb released, the arming vanes rotate up and off in approximately eight revolutions. On impact, the striker weight moves down against the hammer, forcing it against the crusher, which smashes the ampoule against the perforated disc and ampoule seating. Two other things occur simultaneously with this action. The thin brass safety spider moves down, the four protruding ends being pulled free from above the safety collar, and the locking and cocking pellets move down, the former pulling the sleeve with it. As the sleeve clears the two locking balls, their springs force them into the narrower parts of the grooves in which they ride and lock the lower part of the pistol body in the exploder. Since the safety collar is no longer retained by the safety spider, the two safety strips resting against it are free to be forced up. The acetone acts on the delay disc, the time of the action being predetermined; and as the disc is dissolved or softened, the timing spring forces the firing-pin release cup up. Two projections on this cup force the safety strips up with the cup. These strips could not rise until after impact, when the safety spider pulled free from above the safety collar. As the firing-pin release cup rises, the firing-pin retaining balls are forced out by the cocked firing pin into the gradually increasing area, until they finally clear the groove in the upper part of the firing-pin spindle, and release the firing pin to be forced against the detonator.

If an attempt should be made to extract the pistol after it has been dropped and the locking balls have been forced by their springs between the narrow part of the groove and the exploder, such an attempt would merely tend to bind the lower part of the pistol more firmly, the result being that the upper part would be unthreaded and the firing-pin release cup pulled clear of the firing-pin retaining balls. As the balls clear the groove in the firing-pin spindle, the cocked firing pin would be forced against the detonator and detonate the bomb. Approximately one or two turns would activate the anti-withdrawal functioning of the pistol.

Remarks: The delays which may be incorporated in this pistol, and the identifying color of the groove in the lower body extension housing the firing pin head, are as follows:

No. 17 Mk I—30 min.—Top red, bottom green
No. 17A Mk I—1 hr.—Top red, bottom black
No. 17B Mk I—2 hr.—Top red, bottom yellow
No. 17D Mk I—3 hr.—Top red, bottom blue
No. 17E Mk I—6 hr.—White
No. 17F Mk I—8 hr.—Yellow
No. 17G Mk I—12 hr.—Green
No. 17H Mk I—18 hr.—Red
No. 17J Mk I—24 hr.—Black
No. 17K Mk I—36 hr.—Light blue

The delay is engraved in the pistol body just above the colored groove. The letter added to the fuze designation also indicates the delay. The Fuze Mk II has the same letter and time designations as the Mk I, but the anti-withdrawal device is not present on the latter. The Mk III is similar to the Mk II, except that it has a lighter spider, and the safety pin hole is increased in diameter. The fins of bombs using this pistol and the arming vanes are usually painted red. Early fuzes had a lead anti-withdrawal lug instead of locking balls.

This pistol should never be withdrawn from a bomb that has been dropped from an aircraft.

Nose Pistol No. 19 Mks I and II, and No. 20 Mks I-III (Obsolescent)

Data

Bombs used in .....R.L. 112-lb. Mk VII and Mk VIIC, R.L. 120-lb., R.L. 250-lb., R.A.F. 500-lb. and 550-lb., G.P. 120-lb., and G.P. 250- and 500-lb. Mk I-III
Action.....Instantaneous on impact
Armed condition.....When vanes and vane are off
Fuzes used with.....Tail Pistol No. 5B
Arming time.....6 vane revolutions
Vane span .....2¾ in.
Body diameter .....2.0 in.
Over-all length .....4⅛ in.

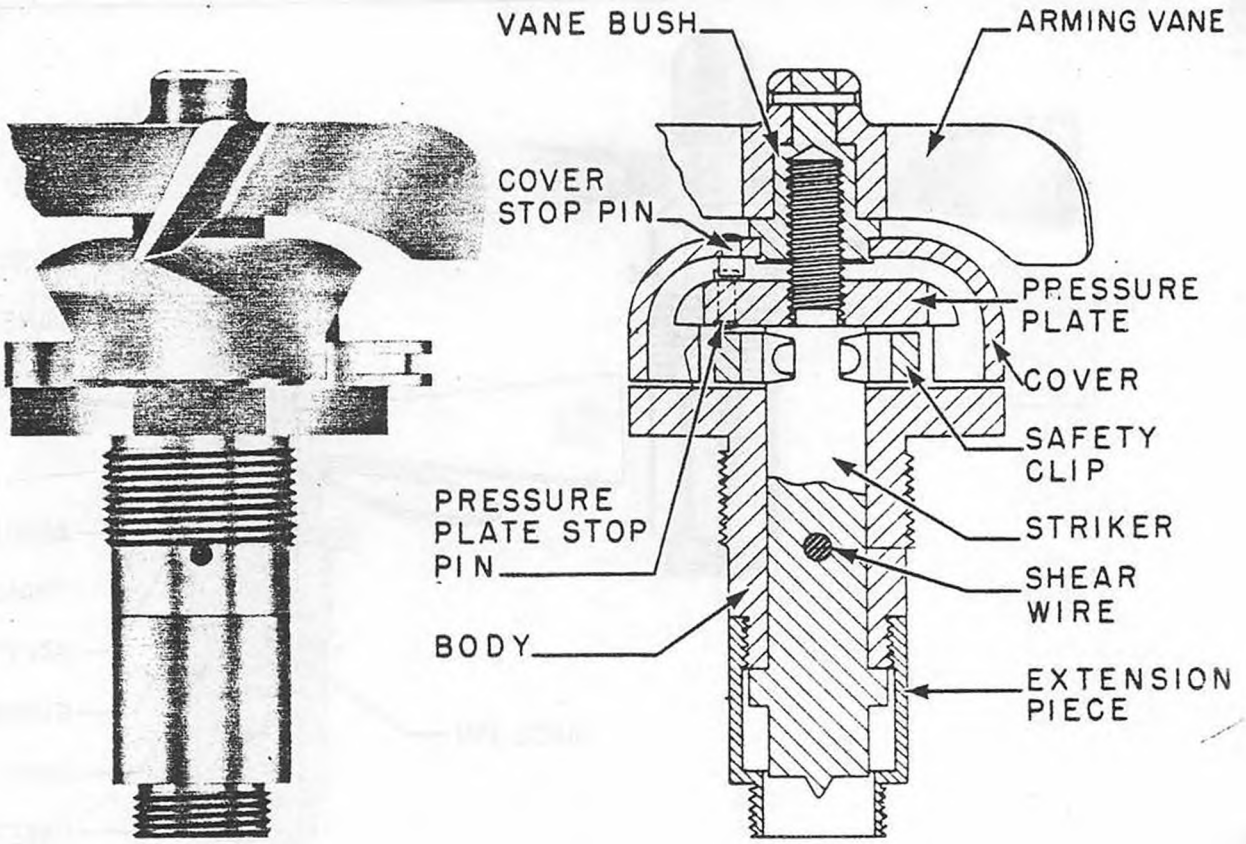

Figure 123—Nose Pistol No. 19 Mk I

Color ....Black or aluminum vanes, aluminum vane cap, brass or aluminum upper body, and brass lower body

Description: The pistol consists of an aluminum upper body and a brass lower body which are bored to receive the striker. The striker has a flange, which can move in an enlarged channel in the lower body. There is a 5/32-in. brass shear pin through the striker and the upper body, holding the striker up. On the upper part of the striker is a pressure plate, which is screwed on and which has eight notches in its circumference. The vane cap, to which is riveted the vane bush and the vanes, threads onto the upper part of the striker. The vane cap and pressure plate are provided with stop pins to prevent the vane cap from screwing down and binding on the pressure plate. Opposite sides of the vane cap are cut away to receive the safety clip, in which is a clip spring that goes around the striker to hold the safety clip on. The stop pin of the safety clip fits into one of the notches

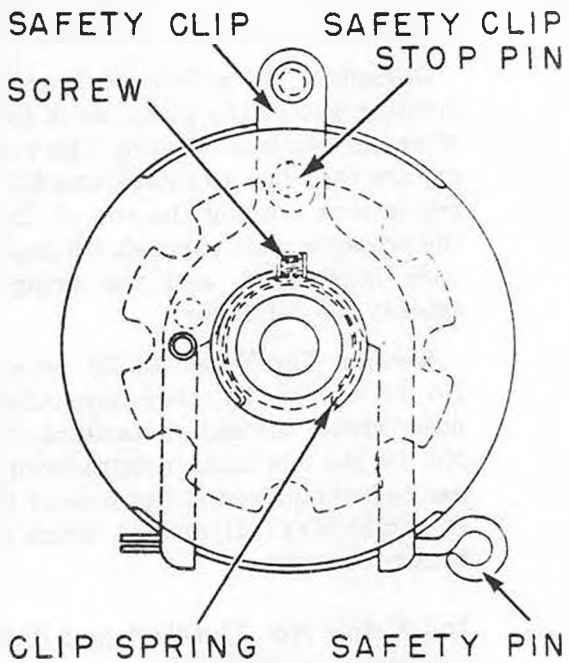

Figure 124—Safety-clip arrangement of Nose Pistol No. 19 Mk I

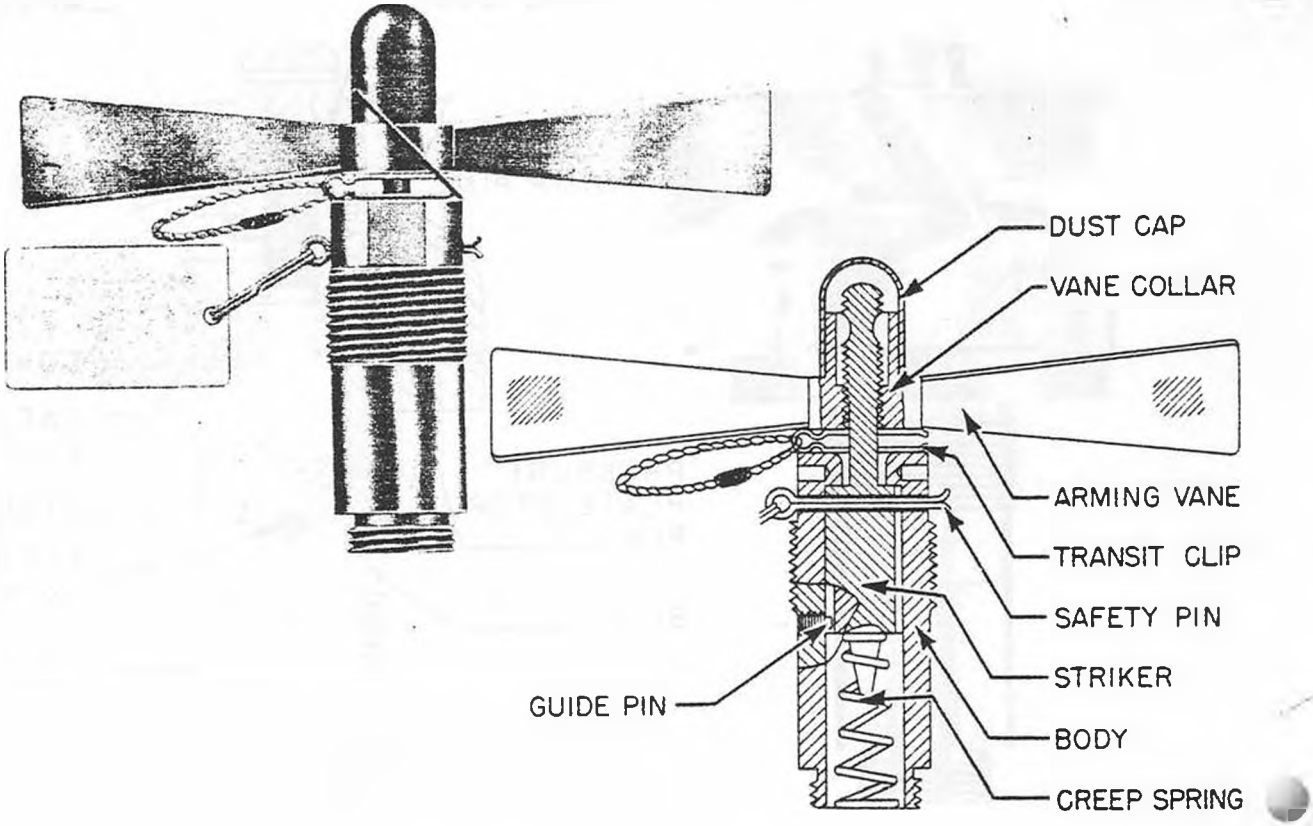

Figure 125—Tail Pistol No. 21

in the pressure plate. A safety pin goes through the ends of the arms of the safety clip.

Operation: The safety pin is pulled when the bomb is put in the plane, as is the safety clip when the bomb is released. The vanes and vane cap are then free to rotate, and fall off after six revolutions, leaving the end of the striker and the pressure plate exposed. On impact the shear wire is sheared, and the firing pin forced against the detonator.

Remarks: The Fuzes No. 20 are similar to the No. 19, except that they have Admiralty taper nose threads instead of standard threads. Pistol No. 19 Mk I is being reintroduced into service use to be employed in the nose of the G.P. 250-lb. bombs Mks I, II, and III, which were recalled to service status.

Tail Pistols No. 21 Mks I and II, and No. 22 Mks I and II (Obsolete)

Data

Bombs used in.....No. 21—G.P. 120-lb. Mks I and II, and G.P. 50-lb. Mk I; No. 22—G.P. 250-lb. Mks I, II, III, and G.P. 500-lb. Mks I, II, III

Action.....Instantaneous on impact
Armed condition.....When vanes are off or when red ring is visible on the striker neck
Fuzes used with.....Nose Pistol No. 19
Vane span....No. 21, 3.25 in.; No. 22, 5.5 in.
Body diameter.....Nos. 21 and 22, 1.1 in.
Over-all length.....Nos. 21 and 22, 4.0 in.
Color.....Nos. 21 and 22, brass

Description: The pistols consist of a brass body, a steel striker, and a copper safety pin. The body has two spanner flats above the threads, and the lower end is threaded. The striker rides on a creep spring, and has four longitudinal grooves in the body, three of which are air-escape grooves, while the fourth engages a guide pin to prevent rotation of the striker. The upper part of the striker is threaded to receive the vanes and the vane collar, to which is attached a cap to prevent dust from accumulating in the striker threads. On the upper end of

the threaded striker spindle is a neck, which is painted red. A transit spring rests between the vane collar and the pistol body. The safety pin fits through the pistol and striker bodies.

Operation: The transit spring is removed before the bomb is put in the plane, and the safety pin when the bomb is placed in the rack. On release, the vanes are freed and rotate up and off, leaving the end of the striker exposed. On impact, the creep spring is overcome, and the striker hits the detonator.

Remarks: These pistols are of similar construction, except for their vane span. The Pistols Mk I are converted Pistols No. 5B. These pistols are obsolete, as are the bombs in which they are used.

Pistol No. 22 Mk I is being reintroduced into service use, to be employed in the tail of the G.P. 250-lb. Bomb Mks I, II, and III, which also have been recalled to service status.

Tail Pistol No. 23 and No. 23 Mk I (Service)

Data

Bombs used in....Smoke Float No. 1 Mks I, II, III, IV, and IVZ
Action.....Instantaneous on impact
Armed condition.....When vanes are off
Vane span .....3.1 in.
Body diameter .....0.8 in.
Over-all length .....3.7 in.
Color .....Aluminum or black

Description: The pistol consists of an aluminum body threaded at the bottom to screw into the float, and a steel striker which rests on a creep spring and is prevented from rotating by a longitudinal guide key moving in a groove in the striker body. A safety pin passes through the pistol and striker bodies. On the upper end of the striker are threads for the vane collar and the vanes, and to these is attached a vane cap to protect the threads of the striker. A transit clip fits between the vane collar and the pistol body.

Operation: The transit clip is removed when the pistol is put in the float, and the safety pin when the float is placed in the dropping gear. When dropped, the vanes and vane collar rotate up and off, leaving the striker riding on its creep spring. On impact, the spring is overcome, and the sharp firing pin hits the detonator.

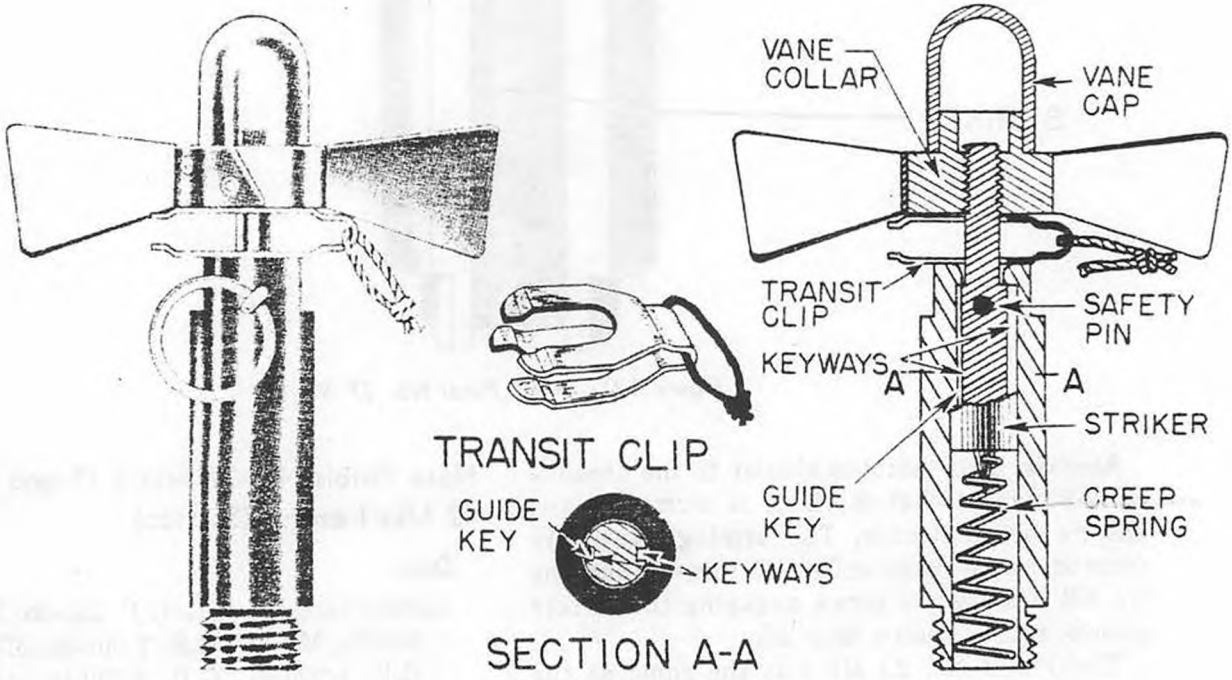

Figure 126—Tail Pistol No. 23

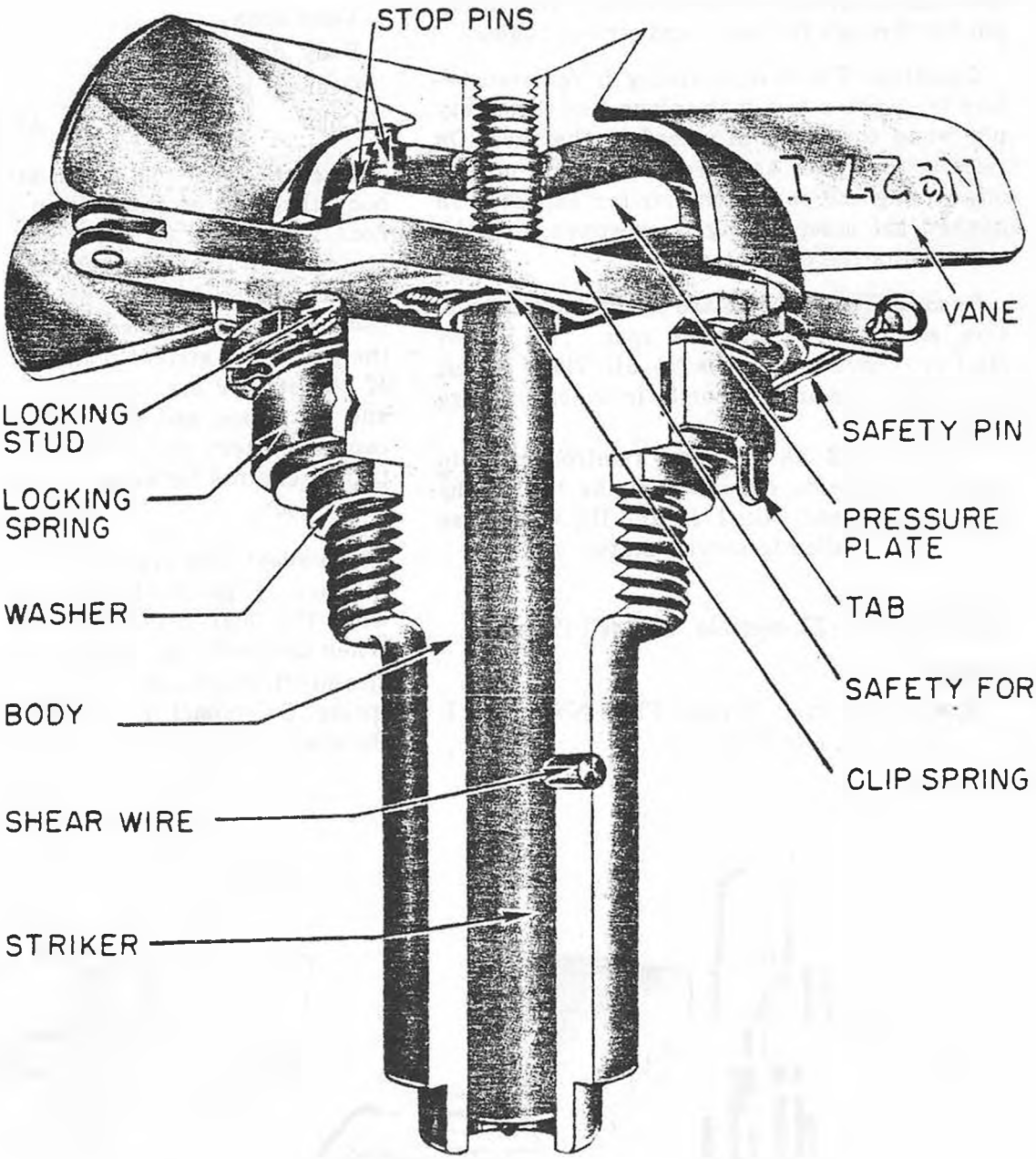

Figure 127—Nose Pistol No. 27 Mk I

Remarks: This pistol is similar to the obsolete No. 5B, except that the body is aluminum and has no body threads. The arming vanes are secured to the vane collar by screws, and the No. 5B has a guide screw engaging the striker groove, rather than a long key.

The Pistol No. 23 Mk I is the same as the No. 23, except that it has a black plastic body.

Nose Pistols No. 27 Mks I, I* and II and No. 42 Mks I and II (Service)

Data

Bombs used in.....G.P. 250-lb. Mk IV, G.P. 500-lb. Mk IV, G.P. 1,000-lb. Mks I and II, G.P. 1,900-lb., G.P. 4,000-lb., all M.C. and H.C. bombs, and I.T. 60-lb.

Action .....Instantaneous on impact
Armed condition ....When the vane boss is 3/16 in. above top of flange on body
Fuzes used with ..Pistols Nos. 28 and 30 Tail
Arming time .....3 vane revolutions
Vane span .....4.0 in.
Body diameter .....1.9 in.
Over-all length .....4.2 in.
Color .....Aluminum or brass vanes, brass body, and steel striker and pressure plate. The No. 42 has a green painted vane cap

Description: The construction of these pistols is essentially the same, the differences being noted below. The brass body has a flange on the top, which has eight notches to receive the stop pin of the safety clip. The lower end is reduced in diameter to receive the detonator, with which it makes a friction fit. The pistol body is bored centrally to receive the steel striker, which is threaded on one end, and onto which are screwed the pressure plate and the vane cap. Both the pressure plate and the vane cap have stop pins to prevent the cap from being screwed down and binding on the plate. A shear wire through the striker and the pistol body holds the striker up.

The vane cap is aluminum, with five vanes, and is cast in one piece. On one of the vanes is stamped the number and mark number of the pistol. The vane cap is riveted to a brass vane bush, which screws onto the striker. Opposite sides of the vane cap are cut away to receive the brass safety clip, having a steel clip spring. The latter fits around the striker and holds the safety clip in place, while the stop pin on the safety clip fits into one of the eight notches in the flange on the pistol body. The safety pin goes through the ends of the arms of the safety clip. A tab locking device fits around the pistol body below the notched flange.

Operation: The safety pin is pulled out before the bomb is put into the plane, and the safety clip is removed when the bomb is released. The vane cap is now free to rotate, and after approximately seven revolutions, falls off. The pistol is now armed. On impact, the shear wire is sheared and the firing pin hits the detonator.

Remarks: The Pistol No. 27 Mk I has a bronze shear wire and blunt firing pin. The No. 42 differs from the No. 27 in that it has an aluminum shear wire, a sharp firing pin, and a green vane cap, vanes, and locking ring. The No. 42 is now replacing the No. 27.

Tail Pistols No. 28 Mks II*, III, and IV; No. 30 Mks III* and IV, and No. 65 Mk I (Service)

Data

Bombs used in .....No. 28-G.P. 250-lb. Mk IV, 500-lb. Mk IV, 1,000-lb., 1,900-lb., and 4,000-lb.; all M.C. bombs; S.A.P. 250-lb. Mk V, and 500-lb. Mk V; A.P. 2,000-lb. Mk IV A.S. 100-, 250-, and 500-lb. Mk IV, when used for land bombardment; and L.C. 500-lb. No. 30-A.S. 100-, 250-, and 500-lb. Mk IV. May also be used in any of above bombs when sensitive-type tail initiation is required
Action .....Instantaneous on impact
Armed condition ....When arming fork is less than two rotations from being completely unthreaded from striker stem
Fuzes used with ....Nose Pistols No. 27, 42, or 44. Tail Pistol No. 28 might be found in A.S. 100-lb. Mk V with Nose Fuze No. 858.
Arming time ....13 arming fork revolutions (arming fork unthreads completely in 15 revolutions)
Body diameter .....2 in.
Over-all length .....3⅞ in.
Color .....Brass body; No. 30 has green groove around body.

Description: The Pistols No. 28 and No. 30 consist principally of a body with 1.1-in. standard threads, a striker threaded at the top end to take the arming fork, and a creep spring to prevent the striker from hitting the detonator until impact. The creep spring is housed in a creep spring holder, which threads into the bottom of the pistol body. A tab locking device for securing the pistol in the bomb is fitted around the body just below the knurled section, and a washer is fitted just above the body threads. Until placed in the bomb, the arming fork is prevented from rotating by a safety plate resting on two narrow recesses inside the upper part of the body, and extending between the arming fork arms.

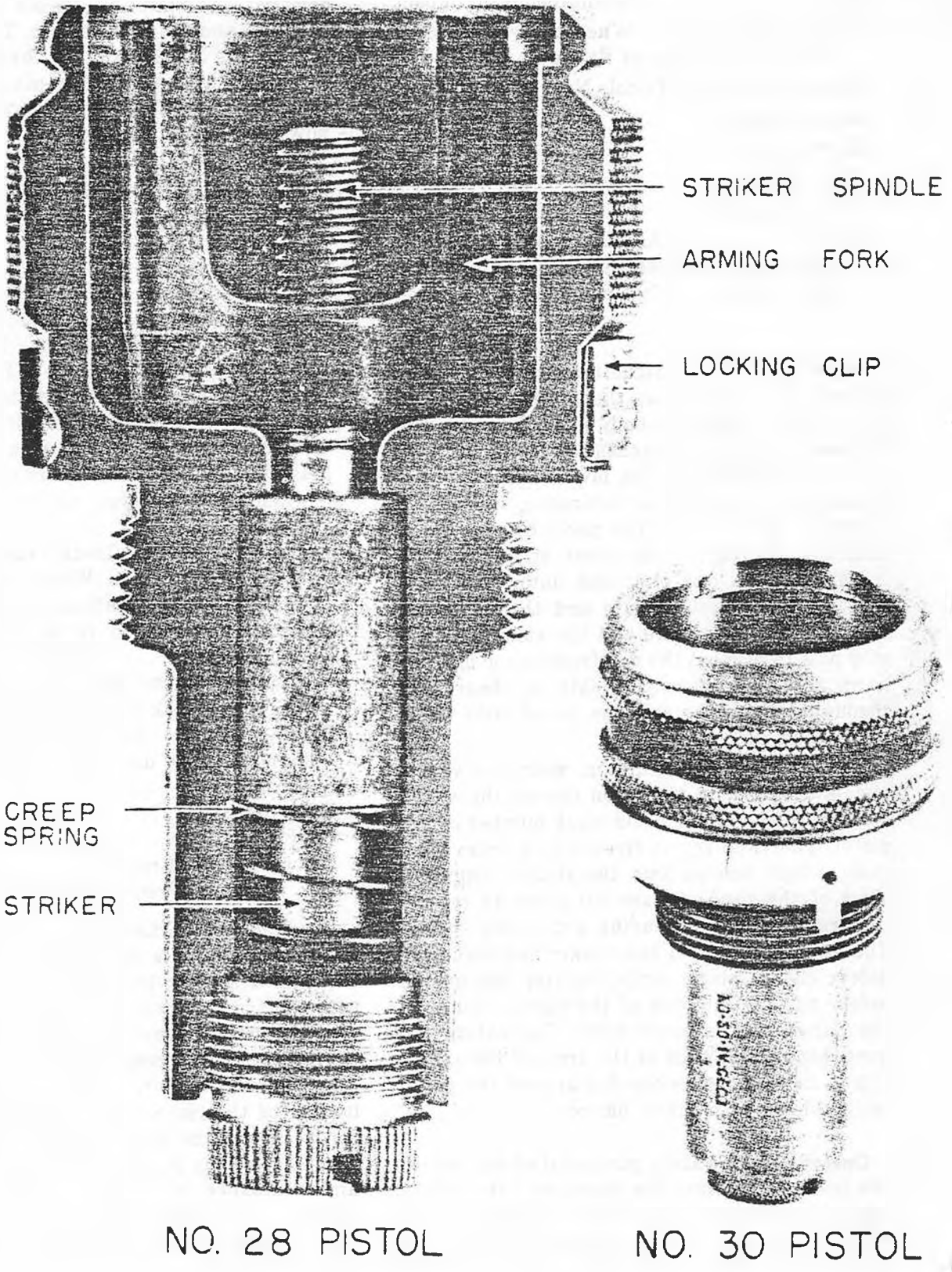

Figure 128—Tail Pistols No. 28 and No. 30

When issued, the pistols are covered at the top by a press-cap and overseal. A guide pin, threaded into the side of the lower body extension, engages in one of two grooves in the striker and prevents it from rotating.

The Pistol No. 28 has a ⅝-in. knurled surface around the upper part of the pistol body. The Pistol No. 30 has the same type of knurled surface with a ¼-in. green groove in the center of the knurled portion. The Pistol No. 28 has a blunt striker, while the No. 30 has a needle-type striker.

Operation: When the bomb is loaded in the plane, the arming fork of the pistol is engaged with the arming fork on the end of the reach rod which extends through the tail unit. When the bomb is released, the arming vanes on the end of the reach rod rotate and thus unthread the arming fork of the pistol until it rises clear of the threaded end of the striker stem. At this point the pistol is armed, and on impact the weight of the striker body is sufficient to overcome the creep spring and force the striker point against the cap in the detonator.

Remarks: The Pistol No. 30, though originally intended primarily for use in the A.S. bombs, is gradually replacing the No. 28 in other types of bombs in which a sensitive-type tail initiation might be required. The No. 30 is now considered the standard British tail pistol.

No. 28 Mk II* is a converted Mk II, which is obsolete, and the Mk III is of new manufacture. The Mk IV is of similar construction, but the body, safety plate, and creep spring holder are of moulded plastic material. Also in the Mk IV an internal projection in the central bore replaces the guide pin of the earlier marks. Pistols No. 30 Mk III* and Mk IV are similar to the Pistols No. 28 Mk II* and Mk III, except that the striker has a long, sharp point and the knurled section of the body has a green groove around it.

The Pistol No. 65 Mk I resembles the Pistol No. 28 externally, while internally it differs from it by having a sharp, sensitive striker and a different type arming assembly. The arming assembly consists of an arming screw, pinned securely to the arming fork, and screwed into a threaded central hole in the after end of the striker.

Nose Pistol No. 33 Mk I (Service)

Data

Bombs used in .....F. 20-lb. (with parachute), and G.P. 40-lb. (with parachute)
Action ..... Instantaneous on impact
Armed condition ...When safety cap is off
Fuzes used with .....None
Arming time .....Instantaneous with opening of parachute
Body diameter .....2 in.
Over-all length .....2⅝ in.

Description: The pistol consists of a body bored centrally to receive a striker, and counterbored and threaded at one end to receive a screwed collar which retains a 0.003-in. thick copper shear washer in position on the bottom of the counterbore. The lower end of the body is threaded to screw into the bomb, and a tab locking device is fitted around the body above the threads to secure the pistol in the bomb. A pressure plate is threaded onto the upper end of the striker, and the shear washer is located between the bottom of the striker sleeve and the striker shoulder. A dome-shaped safety cap is placed over the pressure plate, and is retained by a leaf spring. Two safety blocks project through two slots in the safety cap between the pressure plate and the pistol body. The outer ends of the leaf spring each have a lug attached, through which is inserted a safety pin to retain the leaf spring in position during storage and transit. Located between the pressure plate and the safty cap is a conical, coiled safety cap spring.

Operation: When the bomb is to be loaded on the plane, the arming link of the parachute is passed through the inner holes on the lugs. When the bomb is released and the parachute opens, the arming link is pulled free of the lugs, allowing the leaf spring to fly off. The coiled conical spring under the safety cap forces the safety cap off, arming the pistol. On impact, the pressure plate is driven inward. The striker shears the thin shear washer, and strikes the cap in the detonator.

Remarks: The striker of this pistol is of the blunt type. The striker spindle could shear

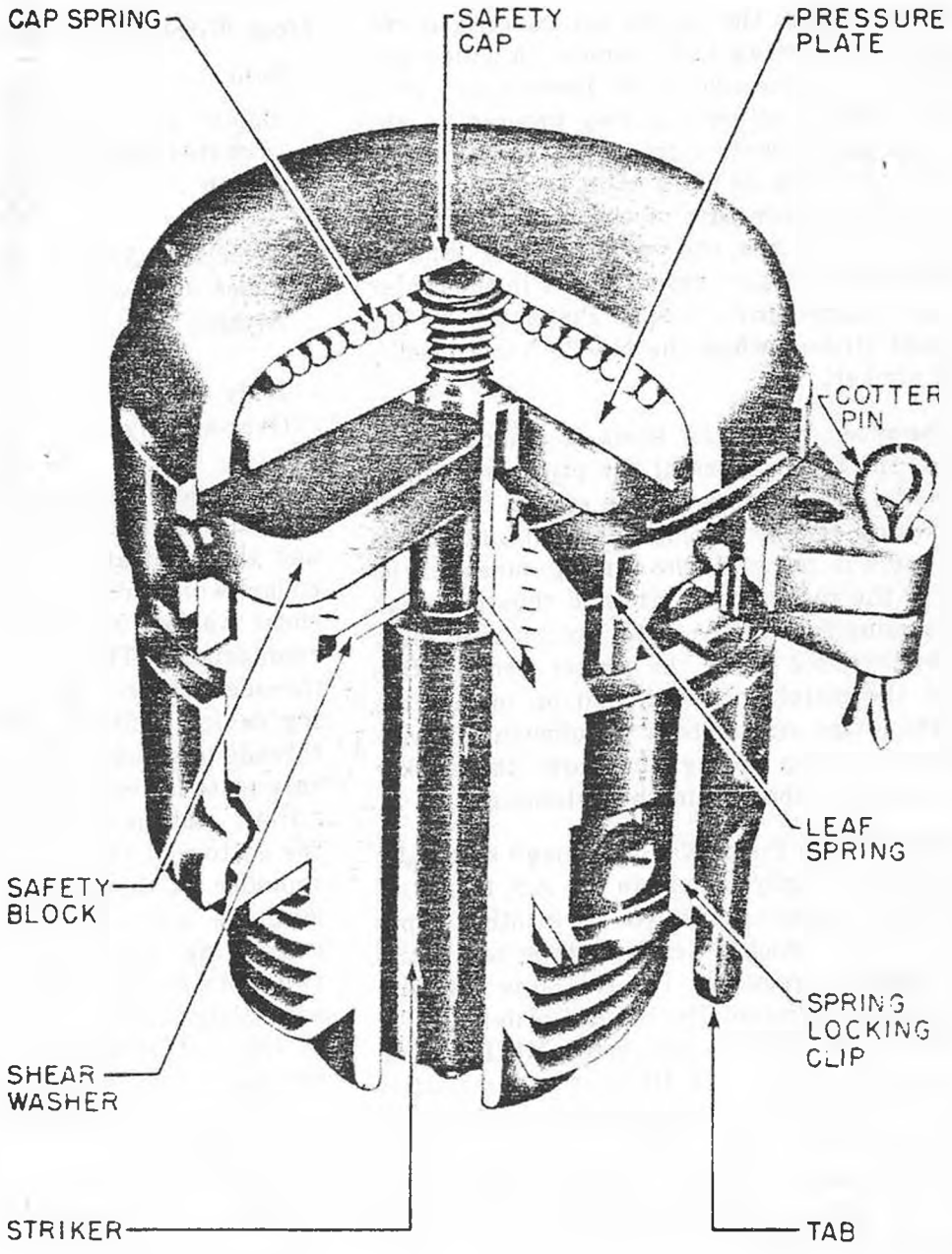

Figure 129—Nose Pistol No. 33 Mk I

through the pressure plate on impact, even if the leaf spring were still in position.

Nose Pistols No. 34 Mk I and No. 29 Mk I (Service)

Data

Bombs used in.....F. 20-lb. (stabilized), G.P. 40-lb. (stabilized), and I.T. 6-lb.
Action .....Instantaneous on impact
Armed condition ....When safety cap is off
Fuzes used with .....None
Arming time..Armed immediately upon release from the plane
Body diameter .....1.8 in.
Over-all length .....2.46 in.
Color .....Brass body, steel striker and pressure plate, and steel safety cap

Description: The pistol consists of a brass body,

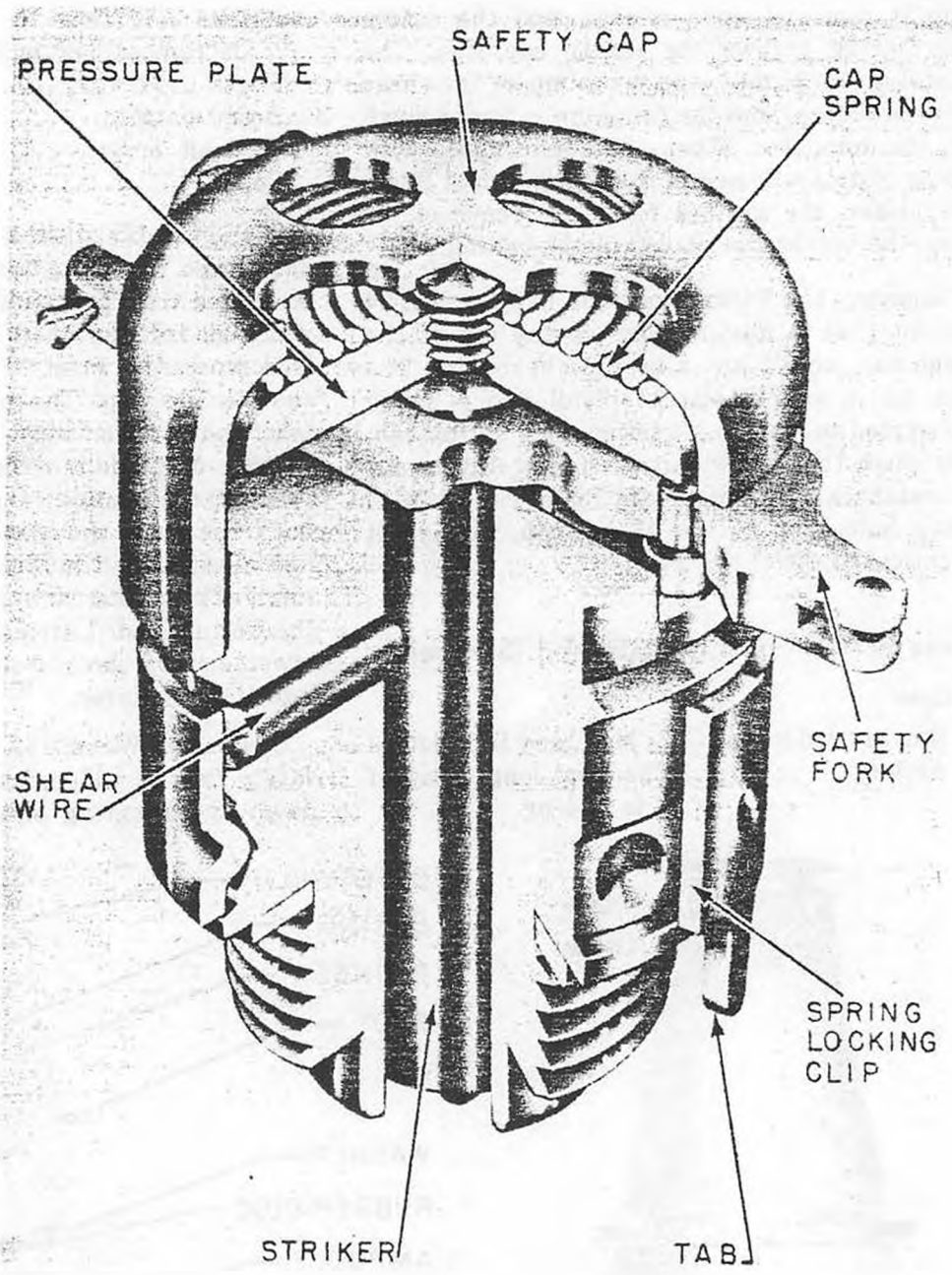

Figure 130—Nose Pistol No. 34 Mk I

a steel striker, and a safety cap. The upper part of the body has six notches to receive the stop pin of the safety clip. The lower end is of reduced diameter to fit into the detonator. There are twelve depressions around the pistol body to hold the tab locking device. The striker is threaded on the upper end to take the pressure plate, while the lower end carries a blunt firing pin. An aluminum shear wire passes through the striker and pistol bodies, and holds up the striker. The steel safety cap is slotted to receive the safety clip, which goes through these slots and under the pressure plate. Under the safety cap is the safety-cap spring, which serves to throw the cap free when the safety clip is removed. The safety pin passes through the ends of the arms of the safety clip.

Operation: Before the bomb is put into the plane, the safety pin is removed. The safety

clip is removed upon release, and the safety cap spring throws the safety cap free. The pistol is now armed, and upon impact the shear wire is sheared and the firing pin is forced down on the detonator. When the bombs fuzed with these pistols are used in the 250-lb. Small Bomb Container, the arming forks are removed before the bombs are placed in the containers.

Remarks: The Pistol No. 29 is like the No. 34 except that it has no holes in the top of the vane cap, and it has a bronze shear wire. The No. 29 is an obsolescent pistol and is being converted to the No. 34 because its spring cannot push the safety cap off under certain circumstances. Later issues of Pistol No. 29 Mk I have holes cut in the safety cap, making it identical to Pistol No. 34.

Nose or Tail Pistol No. 35 Mk I (Service)

Data

Bombs used in....G.P., M.C., and H.C. bombs
Action .....Chemical long delay of 6 to 144 hr.
Armed condition ....When the safety fork is removed or when it has been dropped
Fuzes used with .....None
Body diameter .....1.9 in.
Over-all length .....4.9 in.
Color .....Green

Description: This pistol is of the chemical long-delay type, and has a two-piece body. The upper body is a truncated cone containing a plunger, which is spring-loaded downward. This spring is compressed when the safety fork is under the plunger cap. The upper body screws onto the flanged lower body, in which is carried the acetone ampoule, covered by a rubber disc to prevent the escape of acetone into the upper body. Beneath the acetone ampoule are celluloid discs, which hold up the striker retaining screw. The striker retaining screw is attached to the spring-loaded striker. The diameter of the lower end of the pistol body is reduced to fit into the detonator.

Operation: When the bomb is dropped, the safety fork is pulled, and the plunger is forced down by its spring onto the acetone ampoule.

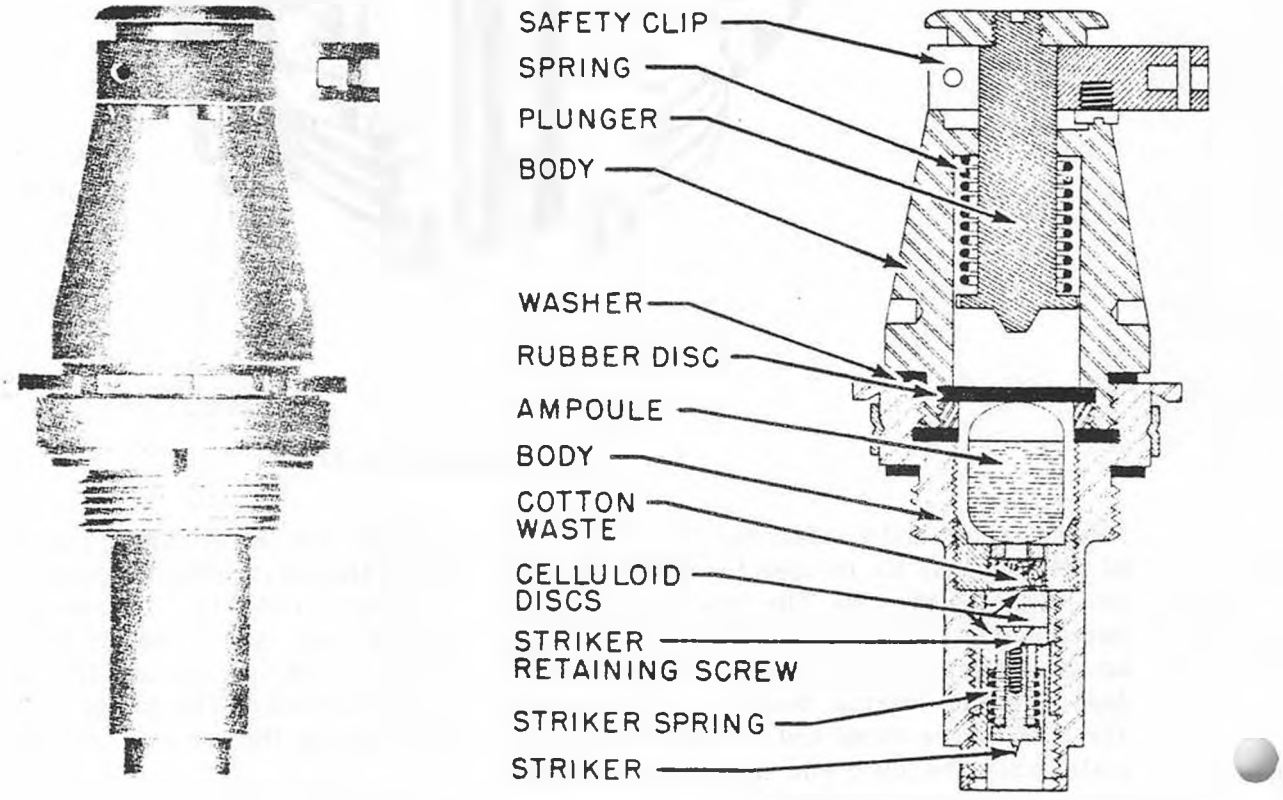

Figure 131—Nose or Tail Pistol No. 35 Mk I

The ampoule is broken and the acetone allowed to flow down onto the celluloid discs, softening them enough to allow the spring-loaded striker to pull the striker retaining screw free, thus forcing the firing pin down onto the detonator.

Remarks: The chemical delay of the pistol is from 5 hours to 144 hours, with settings varied as in the Chemical Long-Delay Pistol No. 37. It must be assumed that the acetone ampoule is broken if the bomb has been dropped, even though the safety fork is still in place. No anti-withdrawal device is used with this pistol as yet.

Nose Pistol No. 36 Mks I and II (Service)

Data

Bombs used in .....Will fit any bomb that takes a No. 27 pistol

Action .....Aerial burst

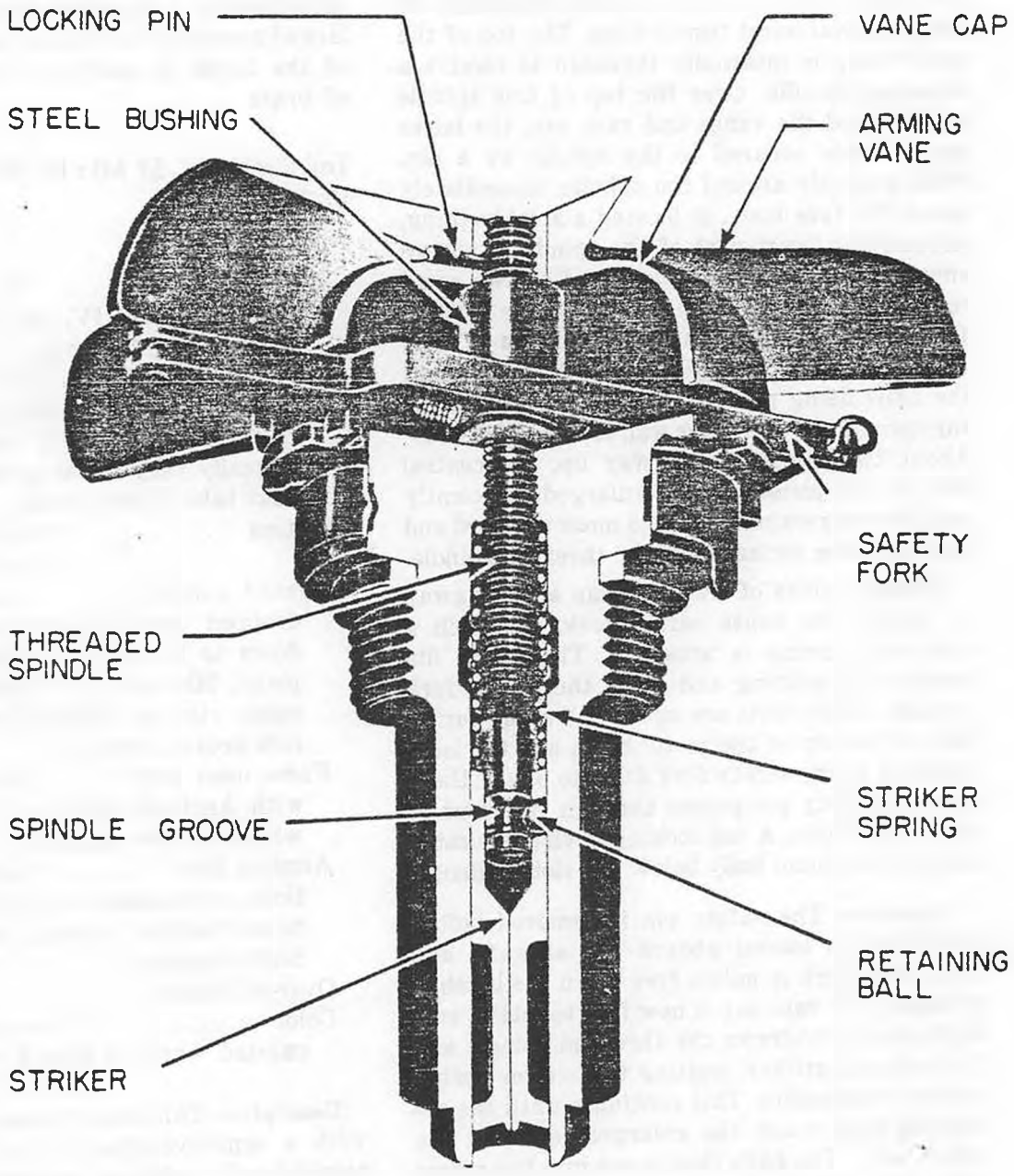

Figure 132—Nose Pistol No. 36 Mk II

Armed condition .....When safety fork is removed
Fuzes used with..Pistol No. 28 or No. 30 Tail
Arming time .....Instantaneous
Vane span .....4.0 in.
Body diameter .....1.9 in.
Over-all length .....4.2 in.
Color .....Brass body
Revolutions to fire .....16 (approx.)

Description: This pistol is externally similar to the Pistol No. 27, but is altered internally to permit aerial-burst functioning. The top of the pistol body is internally threaded to receive a threaded spindle. Over the top of this spindle are screwed the vanes and vane cap, the latter being firmly secured to the spindle by a pin. Fitting loosely around the spindle, immediately above the fuze body, is located a steel bushing. Around the lower part of the spindle is cut an annular groove, which is engaged by two small retaining balls located in holes in the striker. The spindle in the unarmed condition is thus firmly locked in engagement with the striker, the balls being prevented from moving out of engagement by the inner wall of the pistol body. About two-thirds of the way up, the central hole in the pistol body is enlarged sufficiently to allow the retaining balls to move outward and disengage the striker from the threaded spindle.

Opposite sides of the vane cap are cut away to receive the brass safety fork, to which a steel clip spring is attached. The latter fits around the bushing and holds the safety fork in place. Eight slots are cut in the outer perimeter of the top of the pistol body, and the locking stud of the safety fork fits into one of these slots. A safety pin passes through the arms of the safety fork. A tab locking device is located around the pistol body below the slotted flange.

Operation: The safety pin is removed before the bomb is loaded aboard the aircraft, and the safety fork is pulled free when the bomb is released. The vane cap is now free to rotate, and, as it does, withdraws the threaded spindle and the engaged striker, putting the striker spring under compression. This continues until the retaining balls reach the enlarged recess in the pistol body. The balls then move into the recess and disengage the striker from the spindle. The spindle continues to rise until it has moved all the way out of the striker. The balls are then allowed to move back into the striker, and the striker is free to be forced by its spring into the detonator.

Remarks: The pistol incorporates a blunt striker, and therefore is used only with anvil-type detonators. The Pistol No. 36 Mk I is an earlier model of the No. 36 Mk II and is a conversion of stocks of Pistols No. 27. The Mk I differs from the Mk II only in that the former incorporates a threaded bush to form the enlarged recess in the pistol body, while the body of the latter is machined from a single piece of brass.

Tail Pistol No. 37 Mks IV, IV* IV**, V, V*, and VI (Service)

Data

Bomb used in.....G.P. 250- and 500-lb. Mks I, II, and IV, and 1,000-, 1,900-, and 4,000-lb.; M.C. Bombs, S.A.P. 250- and 500-lb. Mk V; and A.P. 2,000-lb. Mks I, II, [illegible]. The dimensions of this pistol are identical to the Pistols No. 28 and No. 30, so theoretically they could be used in any bombs that take these pistols.
Action ..... Chemical long delay of 6 to 144 hr.
Armed condition .....Assumed armed if dropped; armed if arming fork is threaded down to bottom of arming fork cavity in pistol. Mks above IV* have white blotting-paper ring in arming fork cavity to indicate broken ampoule.
Fuzes used with .....None. Formerly used with Anti-disturbance Nose Fuze No. 845, which is now obsolete.
Arming time .....8 arming-fork revolutions, or instantaneous if dropped from sufficient height to break ampoule
Body diameter .....2 in.
Over-all length .....4.25 in.
Color .....Brass body; body groove painted white in Mks IV**, V*, and VI

Description: This is a chemical long-delay pistol with a sensitive-type striker. Delays are obtained by the action of acetone on celluloid. Alternative delays result when the number of

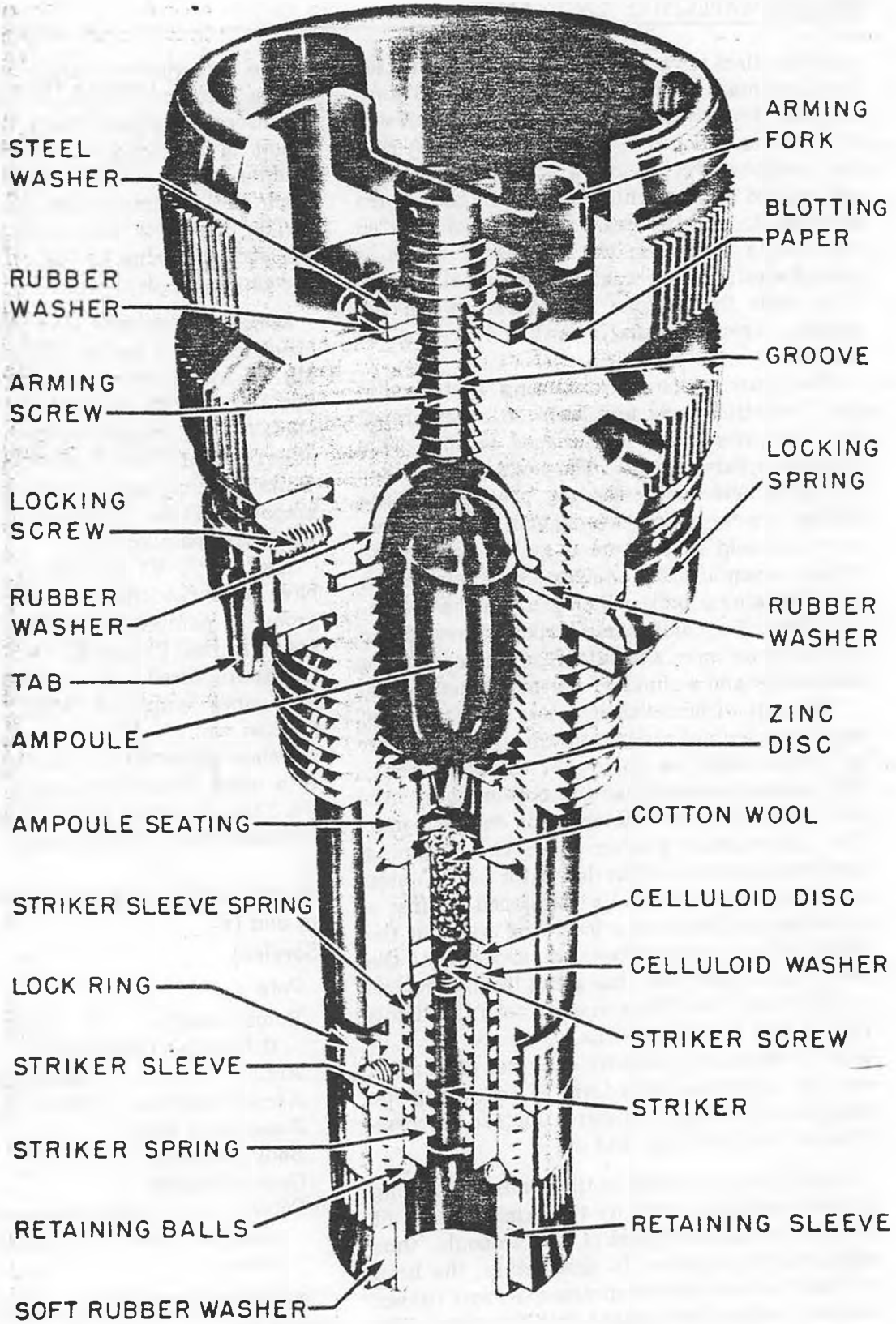

Figure 133—Tail Pistol No. 37 Mk V

celluloid discs is varied. The pistol is constructed in three main parts, the head, body, and anti-removal device. The head and body are screwed together and locked by a locking screw. A rubber insertion washer and a soft rubber washer are located between the head and the body when assembled. Into the head of the pistol is fitted an arming screw, on the spindle of which is placed a soft rubber washer and a steel washer. This seals the acetone in the fuze when the arming screw threads inward and breaks the ampoule.

The glass ampoule containing acetone fits into the pistol body and rests on a perforated zinc disc over the wedge-shaped seating. This seating is threaded into the body. The striker spring is held compressed by the head of the striker screw, which is engaged in a countersunk celluloid disc inserted at the top of the striker assembly. The striker sleeve is retained by 16 retaining balls which seat on the retaining sleeve. The compressed striker-sleeve spring is located between a shoulder in the bore of the pistol body and a shoulder on the striker sleeve.

The anti-withdrawal device is a soft rubber washer assembled over a retaining sleeve, which is screwed onto the bottom of the pistol body. This sleeve is smaller at the bottom to fit into the head of the detonator when in the bomb. The soft rubber washer locks the retaining sleeve into position in the detonator head. A step on the retaining sleeve is positioned against a corresponding step on a lock ring when in the bomb. A lock screw secures the lock ring to the pistol body. The pistol has a tab locking device.

The Pistol No. 37 is similar to Tail Pistols No. 28 and No. 30 externally, except for a V-shaped notch around pistol in center of knurled exterior. Knurling is in form of cuts along the longitudinal axis of the pistol, instead of cross-cuts as in the Nos. 28 and 30.

Description: On release of the bomb, the arming screw is screwed down by the arming vanes of the bomb tail and crushes the ampoule, thus releasing the acetone. In descending, the head of the arming screw compresses the soft rubber washer, sealing the acetone into the pistol. The acetone attacks the celluloid disc or discs until the countersunk screwhead of the striker is released, thus allowing the striker to be moved forward by the action of the striker spring.

The soft rubber washer locks the retaining sleeve into the detonator head. Any attempt to unscrew the pistol body from the bomb will result in the body's unscrewing from the retaining sleeve. After approximately one-half turn, the retaining balls are released and the striker assembly moves forward by action of the striker spring to force the striker against the cap in the detonator.

Remarks: Mks I and II of the Pistol No. 37 are obsolete. Mk I had no anti-withdrawal device. Mk III incorporated an anti-wthdrawal device, but the arming screw had left-hand threads. Mk IV has a right-hand-thread arming screw. Mks IV* and V are similar to Mk IV, but have a white blotting-paper ring to indicate a broken ampoule. These fuzes employ arming vanes which are painted red.

Mks IV**, V* and VI of the Pistol No. 37 have no anti-withdrawal device. The V-shaped groove is painted white. The Mks IV** and V* are converted Pistols Mk IV* and Mk V. Mk VI is manufactured to a modified design. The arming vanes employed with these pistols are painted white.

Delays intended for this pistol are indicated by a letter after the number: No. 37, 6 hours; No. 37A, 12 hours; No. 37B, 36 hours; No. 37D, 72 hours; No. 37E, 144 hours.

Nose Pistol No. 38 Mks I, IM, II, IIM, III, and IV (Service)

Data

Bombs used in....F. 20-lb. (stabilized), and G.P. 40-lb. (stabilized)
Action.....Instantaneous on impact
Armed condition...When the safety cap is off
Fuzes used with.....None
Body diameter .....2.0 in.
Over-all length .....2.5 in.
Color.....Unpainted or bronze-lacquered aluminum body; aluminum vane cap and vanes

Description: The pistol is made entirely of mazak, a zinc-base alloy, and consists mainly of a body, striker, and vane cap. The upper pistol body has four slots for locating the safety pin, which passes through the vane cap and rests in front of one of the parts of the pistol body, thus

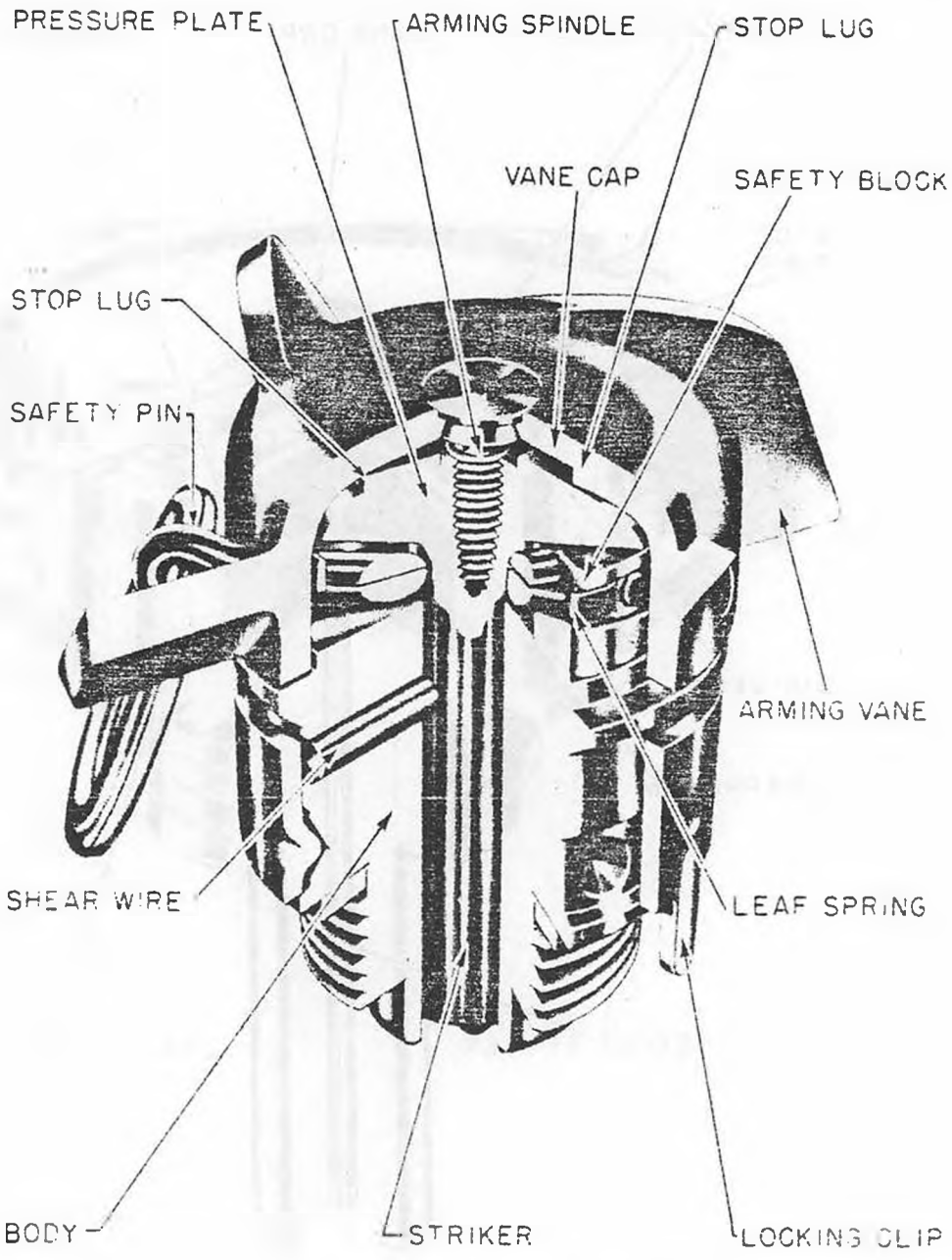

Figure 134—Nose Pistol No. 38 Mk III

preventing the rotation of the vanes. The lower end of the pistol body is of reduced diameter and fits into the detonator.

Around the body are twelve depressions, which hold the tab locking device. The striker and pressure plate are cast in one piece, with a threaded hole in the top of the striker to receive the arming screw. On the top of the pressure plate there is also a stop pin to prevent the vane cap from being screwed down too tightly. An aluminum shear wire passes through the striker and the pistol body. The vane cap has four vanes integrally cast with it, and it is riveted to the vane screw. In the side of the vane cap is a small hole to accommodate the safety pin. Mks IM, IIM, III, and IV have a pair of spring-loaded safety blocks under the pressure plate.

Operation: When the bomb is put in the plane,

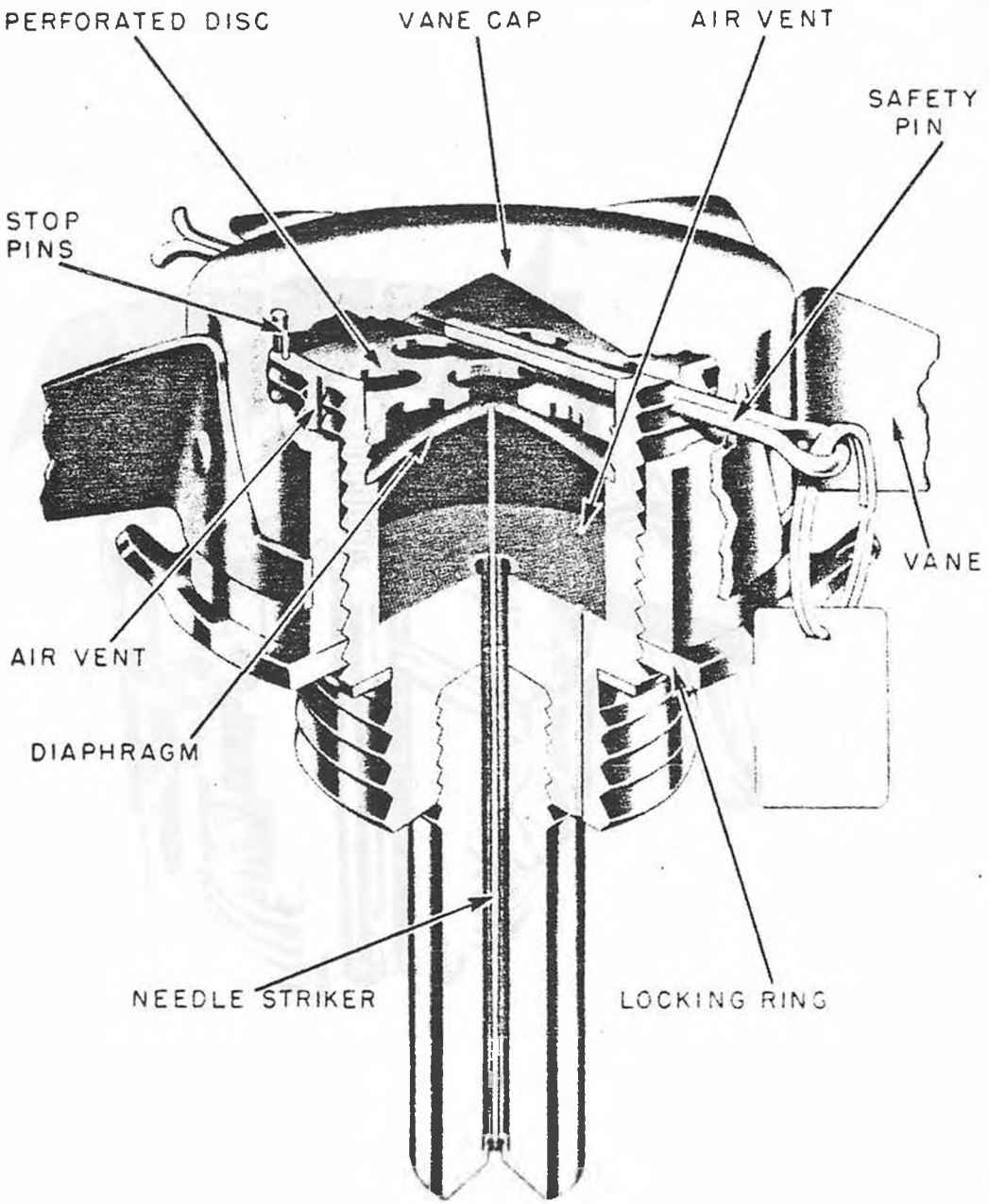

Figure 135—Nose Pistol No. 44 Mk II

the safety pin is removed, and upon release the vanes are freed to rotate. The vane screw threads out of the pressure plate, and the vane cap and vanes fall away, leaving the striker and pressure plate exposed. The spring-loaded safety blocks fly out on Mks IM, IIM, III, and IV when the vane cap clears the lower edge of the pressure plate. On impact, the shear wire is sheared and the blunt firing pin hits the detonator.

Remarks: The Mk IM is like the Mk I except that it has a pair of spring-loaded mazak safety blocks fitted into opposite slots under the pressure plate to prevent the pistol from firing when dropped safe on a hard target. The Mk II is the same as the Mk I except that the body, striker, and vane cap are of brass rather than of ma[illegible]. The Mk IIM is simlar to the Mk II, but has two spring-loaded brass safety blocks under the

pressure plate. The Mk III is like the Mk IM except that the shear wire is of brass. The Mk IV is the same as the Mk IIM, but has a brass shear wire.

British Nose Pistols No. 44 Mks I, II, and III, and No. 55 Mk I (Service)

Data

Bombs used in....G.P. 250-lb. Mk IV, G.P. 500-lb. Mk IV, G.P. 1,000-lb. Mks I and II, G.P. 1,900-lb., G.P. 4,000-lb., and all M.C. and H.C. bombs
Action.....Instantaneous on impact; diaphragm operated
Armed condition.....When vane cap is removed
Fuzes used with....Tail Pistols No. 28 and 30
Vane span.....No. 44, 4 in.; No. 55, 7.5 in.
Body diameter .....1.75 in.
Over-all length .....3.8 in.
Color ..... Brass

Description: The pistol consists of a vane cap, body, and body extension, all of which are made of brass. The vane cap of the Pistol No. 44 is cast and has five vanes. The No. 55 has four vanes. There are two small holes on opposite sides of the cap for the safety pin. There is a steel stop pin in the top of the vane cap, and a similar one on the pistol body to prevent the cap from being screwed down too tightly. A steel retaining disc is threaded in the upper pistol body above the diaphragm. In this disc are drilled seven holes to allow air passage. Under the retaining disc is a 1¼-in. sheet-brass diaphragm to which is soldered a 3⅛-in. steel needle striker which passes down into the body extension. There are two air-pressure holes in the pistol body to equalize air pressure under the diaphragm, preventing firing due to air compression while the bomb is falling. A brass locking ring is located around the pistol body.

Operation: The safety pin is removed manually when the bomb is loaded aboard the plane, and the vanes are freed to rotate upon release. The vane cap falls away after about 13 revolutions, leaving the steel disc and diaphragm exposed. Detonation occurs on impact, or by the blast wave of the preceding bomb. It has been reported that the diaphragm has also been reversed by the cushion of air built up beneath the bomb as it nears the ground.

Remarks: The Pistol No. 44 Mk II is similar to the Mk I, except that the two air vents in the side of the pistol are replaced by three air vents in the base of the pistol body.

The Pistol No. 44 Mk III differs from the Pistol Mk II in several respects. The vane cap is retained by a new-type safety clip, the hook end of which locates in a hole in one of the arming vanes, while the plain end passes through the single hole in the vane cap and engages a safety-pin groove in the pistol body. The two safety-pin holes in the vane cap and the four notches in the top edge of the body are omitted. The air-pressure relief groove is diametrically opposite the safety-pin groove, and extends from the top of the body to a point level with the top of the safety pin groove.

The Pistol No. 55 Mk I is identical to the No. 44 Mk III, except that four anemometer-type vanes are used. The pistol is used in the two off-center nose fuze pockets of H.C. bombs having three nose fuze pockets. These pistols are designed to replace the Pistol No. 27.

Nose Pistols No. 45 Mks I and II, and No. 52 Mks I and II (Service)

Data

Bombs used in....No. 45, F. 20-lb. and G.P. 40-lb. bombs; No. 52, all U. S. AN-GP bombs
Action.....Instantaneous on impact
Armed condition.....When vane cap is off
Fuzes used with.....None
Arming time.....12 vane revolutions
Vane span.....No. 45, 4.0 in.; No. 52, 3.7 in.
Body diameter.....No. 45, 1.75 in.; No. 52, 2.0 in.
Over-all length .....2.5 in.
Color.....Brass body and locking ring; No. 45, black cap and vanes; No. 52, brass cap and vanes

Description: The Pistol No. 45 Mk I consists of a vane cap, body, and body extension, or striker guide. The pistol is similar to the Nose Pistols No. 44 and No. 55, but has a shorter shank so that it may fit smaller bombs. Six vanes in pairs are riveted to the black vane cap. A steel stop

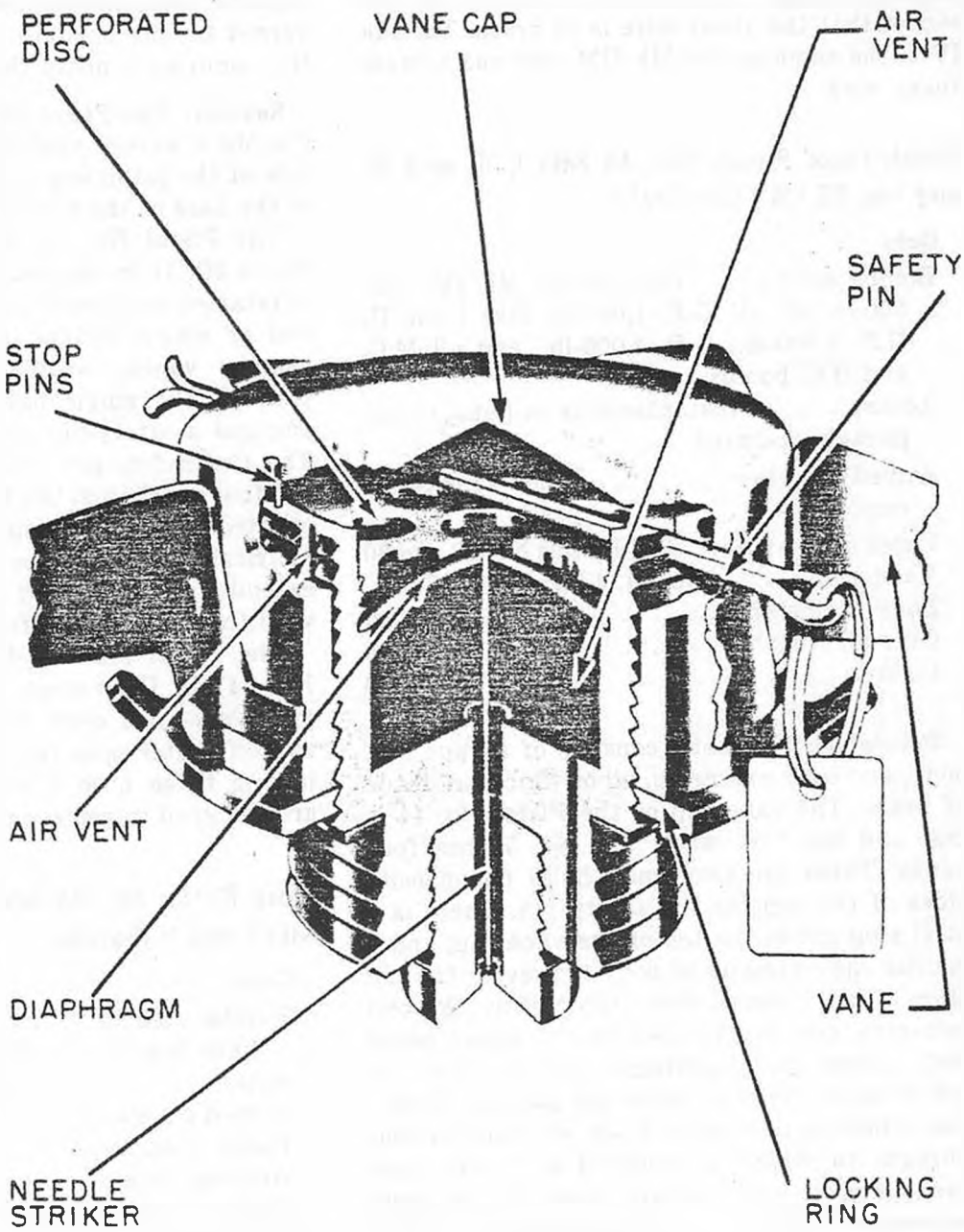

Figure 136—Nose Pistol No. 52 Mk I

pin on the inside of the vane cap engages a similar pin on the top of the pistol body to prevent the cap from screwing down too tightly and binding. In the upper part of the pistol body there is screwed a steel retaining disc, in which are drilled seven holes to allow air passage. Located under the disc is a sheet-brass diaphragm to which is soldered a steel needle striker, which extends into the body extension. There are two air-pressure holes in the side of the body which equalize the pressure above and below the diaphragm as the bomb falls. Around the pistol body is a brass locking ring.

Operation: The safety pin is removed when the bomb is loaded aboard the plane. Upon release, the arming vanes rotate, and after revolutions the vane cap and vanes fall away, leaving the retaining disc and diaphragm exposed. On impact, the diaphragm is reversed by

the compressed air beneath the fuze, and the striker is driven into the detonator. The blast wave of the preceding bomb may fire the pistol.

Remarks: The Pistol No. 45 Mk II is similar to the Mk I, except that the two air vents in the side of the pistol body are replaced by three air vents in the base of the pistol body.

The Pistol No. 52 Mk I is similar to the No. 45 Mk II, except that only five vanes are used, and the vanes and vane cap are of unpainted brass.

The Pistol No. 52 Mk II is similar to the No. 52 Mk I, except that the vane cap is retained by a new-type spring safety clip, the hook end of which locates in a hole in one of the arming vanes, while the plain end passes through the single hole in the vane cap and engages a safety-pin groove in the pistol body. The two safety-pin holes in the cap and the four notches in the fuze body are omitted. The air-pressure relief groove is diametrically opposite the safety-pin groove and extends from the top of the body to a point level with the top of the safety-pin groove.

Side-Pocket Pistol No. 47 Mk I (Service)

Data

Bombs used in.....G.P. 4,000-lb. Mk I, H.C. 2,000-lb. Mk I, and H.C. 4,000-lb. Mks I and II

Action.....Chemical long delay of ½ hr.

Armed condition....When the arming screw is down, or when the pistol has been dropped

Fuzes used with....Nose Pistols No. 27, 42, or 44; Tail Pistols No. 28, 30, or 37

Body diameter .....2.0 in.

Over-all length .....4.5 in.

Color....Brass body with steel arming screw

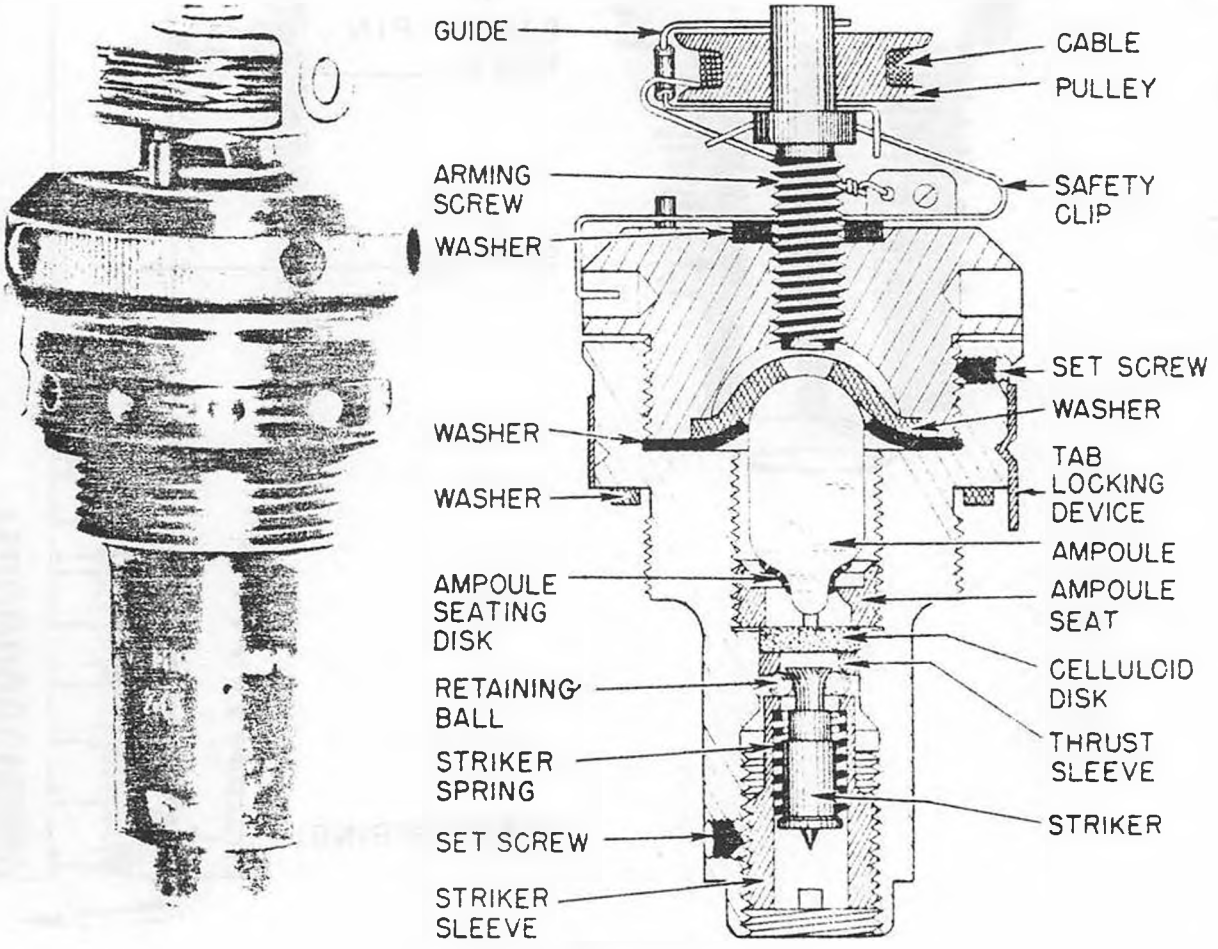

Figure 137—Side-Pocket Pistol No. 47 Mk I

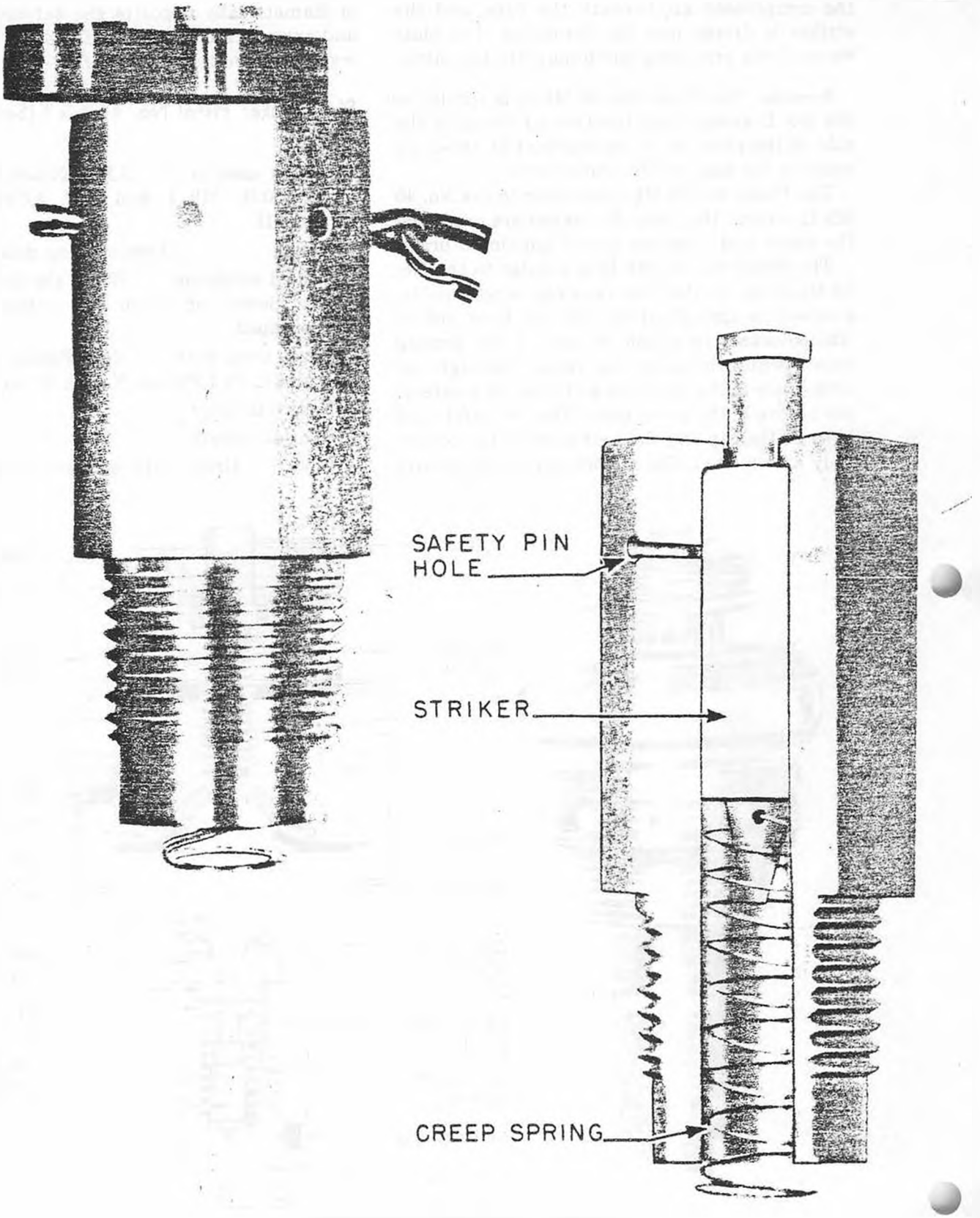

Figure 138—Tail Pistol No. 48 Mk I

Description: This pistol is of the chemical long-delay type used in the side pockets of the above-mentioned bombs. Extending out of the brass body is a steel arming screw. At the top of the arming screw is fastened a brass or steel pulley, around which is wrapped a phosphor-bronze wire. This wire is secured to the pulley, runs out through a guide key, and is soldered to the safety clip, which is located between the pulley and the head of the pistol. The safety pin passes through the arms of the safety clip, preventing the latter from being removed accidentally. Below the arming screw is an ampoule of acetone, which is sealed in by a rubber washer above it. Below the acetone ampoule is a zinc seating disc, which acts as a knife edge to break the ampoule, and a celluloid disc, which holds up the spring loaded striker and its retaining balls.

Operation: When the bomb is put in the plane, the safety pin is removed. Upon release, the safety clip is pulled out, and the wire, which is attached to it and also around the pulley, is reeled off the pulley. This screws the arming screw down into the acetone ampoule, breaking it and allowing the acetone to run out onto the celluloid disc. When the celluloid has become softened, the force of the compressed firing spring cams the release balls out, and forces the striker against the detonator.

Remarks: This pistol has a ½-hour delay, and has no anti-withdrawal device incorporated in it.

Tail Pistol No. 48 Mk I (Service)

Data

Bombs used in....Smoke Float No. 2 Mk II
Action.....Instantaneous on impact
Armed condition....When the safety clip is removed
Fuzes used with.....None
Arming time .....Instantaneous
Body diameter .....⅞ in.
Over-all length .....2¾ in.
Color .....Black or brass

Description: This pistol consists of a body containing a simple inertia-type striker resting on a creep spring. The pistol body is hexagonal, and in each side, approximately ½ in. from the top, is a hole for the insertion of a safety pin. The inside of the body is round, and accommodates a square striker, which is rounded at the top to receive the safety clip. The creep spring is attached to the firing pin. The lower end of the pistol body is threaded to go into the smoke float.

Operation: When the float is placed in the dropping gear, the safety pin is removed. Upon release, the safety clip is pulled, and the striker is left riding on its creep spring. On impact, the spring is overcome, and the firing pin hits the percussion cap, which fires the ignition charge.

Remarks: This pistol is replacing the Fuze No. 844 for use in the Smoke Float No. 2.

Tail Pistol No. 53 and No. 53A (Service)

Data

Bombs used in....G.P. 250- and 500-lb. Mks I, II, and IV, 1,000-, 1,900-, and 4,000-lb.; all M.C. bombs; S.A.P. 250- and 500-lb. Mk V; A.P. 2,000-lb. Mks I, II, and III. The dimensions of this pistol are identical to those of the Pistols No. 28 and No. 30, and so could be used in any bombs in which the latter are used.
Action....Chemical long delay of ½ or 1 hour
Armed condition.....Assumed armed if dropped; armed if arming fork is threaded down to bottom of its cavity in pistol
Fuzes used with .....None
Arming time.....Eight arming-fork revolutions, or if dropped from sufficient height to break ampoule
Body diameter .....2 in.
Over-all length .....4.25 in.
Color....Brass body; V-shaped notch around body painted white

Description: This pistol is similar in appearance to the No. 37 Mk IV, except that the notch around the knurled exterior is painted white, and there is no anti-withdrawal device incorporated. Internally, the fuse differs from the No. 37 Mk IV in that a modified striker assembly is used to enable shorter delays to be obtained. The striker is retained by a row of balls around its head. The balls retain the striker by their contact with a chamfered thrust sleeve, which, in turn, is located by a celluloid disc. The pistol is fitted with a device, similar to that

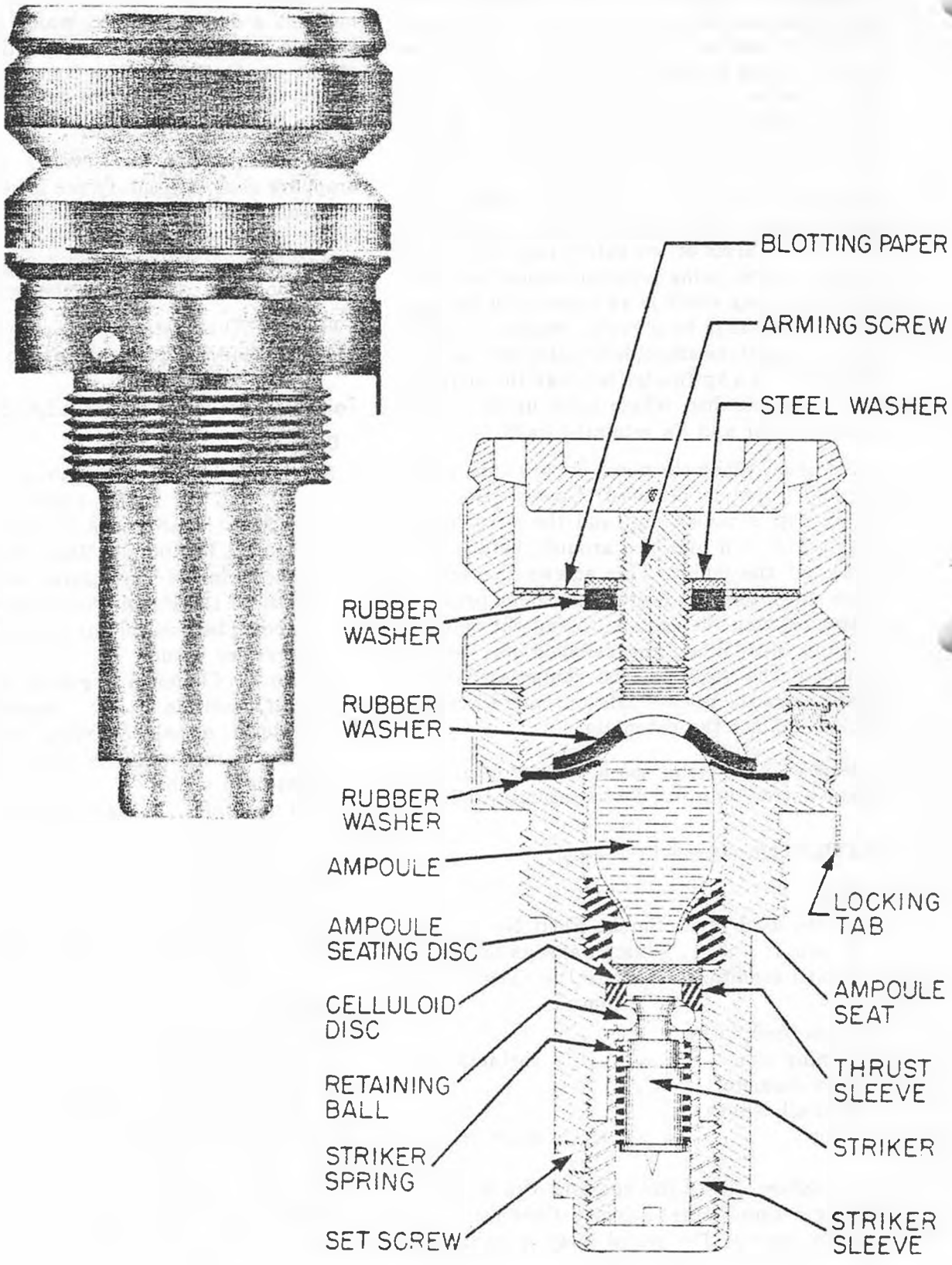

Figure 139—Tail Pistol No. 53

incorporated in the No. 37 Mk V, consisting of a blotting-paper ring fixed to the base of the pistol head. The arming screw is provided with three slots along a portion of its screwed length. If an ampoule breaks, the tinted acetone passes through these slots into the head of the pistol and stains the blotting paper.

Operation: These pistols are issued assembled for use. When a bomb is fuzed with this pistol, the press cap and safety plate are removed, and the arming screw engaged by the arming fork of the tail arming assembly. The standard arming vanes on the tail unit will be replaced by the special red-colored vanes packed in the pistol box.

When the bomb is released from the carrier, the arming screw of the pistol is screwed down by the rotation of the arming vane of the tail unit, and crushes the ampoule, thus releasing the acetone. The forward movement of the arming screw then continues, and the head of the screw compresses the soft rubber washer, sealing the acetone in the pistol. The solvent action of the acetone softens the celluloid disc so that the thrust sleeve is allowed to move upward, forced by the camming force of the retaining balls against its chamfered edges. The balls are then released, and the striker allowed to operate.

Remarks: The 30-minute delay is obtained with Pistol No. 53, and the one-hour delay with Pistol No. 53A. The alternative delays are provided by varying the strength of the acetone, which is tinted green for the thirty-minute delay and violet for the one-hour delay. The pistols are shipped with the ampoules assembled, and the ampoules are not to be changed. The times of delay quoted are subject to a variation of approximately plus or minus 30%. Should a bomb fuzed with a Pistol No. 53 or No. 53A be dropped from a height of 12 inches or more, the bomb must be considered armed. It is the practice of the R.A.F. Bomber Command to paint the arming vanes of the tail unit white, but this practice is not general.

Tail Pistols No. 54 Mk I and No. 60 Mk I (Service)

Data

Bombs used in....No. 54—G.P. 250- and 500-lb. Mk IV; G.P. 1,000-, 1,900-, and 4,000-lb.; all M.C. bombs; S.A.P. 250- and 500-lb. Mk V; A.P. 2,000-lb. Mk IV; and A.S. 100-, 250-, and 500-lb. Mk V. No. 60—I.B. 400-lb. Mk I
Action.....Instantaneous on impact; semi-all-ways action
Armed condition....When arming spindle is unscrewed from striker head
Fuzes used with.....No. 54, Nose Pistols No. 27, 42, or 44; No. 60, none
Arming time....15 arming-fork revolutions
Body diameter .....2.4 in.
Over-all length.....3.6 in. w/o striker guide
Color .....Brass body

Description: The pistol consists of a brass body with a hollow cavity into which is placed the striker assembly, an inertia ring, a retaining plate, and an arming fork with a threaded spindle. The striker assembly is composed of a tapered striker head, bored and threaded internally to receive the arming spindle, and a needle striker, positively secured to the striker head and positioned by a striker guide threaded into the lower extension of the pistol body. A creep spring bears upwards against the striker head, and a guide pin, located in the pistol body and riding in a groove in the striker head, prevents the striker head from rotating. The body is recessed to permit downward movement of the striker head; and an internal shoulder is provided in the large hollow cavity to seat the retaining plate, which is held in place by three grub screws. The arming spindle is pinned to the arming fork, and threads through the retaining plate into the striker head. The inertia ring fits loosely under the retaining plate and is beveled internally to mate with the conical shaped striker head.

A special locking washer is used with this pistol. This washer has four studs bent downward in such a manner that they engage in recesses in the exploder container. When the pistol is fully screwed home, one of the 19 external tabs of the locking washer is bent upwards to engage in one of the two grooves cut in the base of the pistol head.

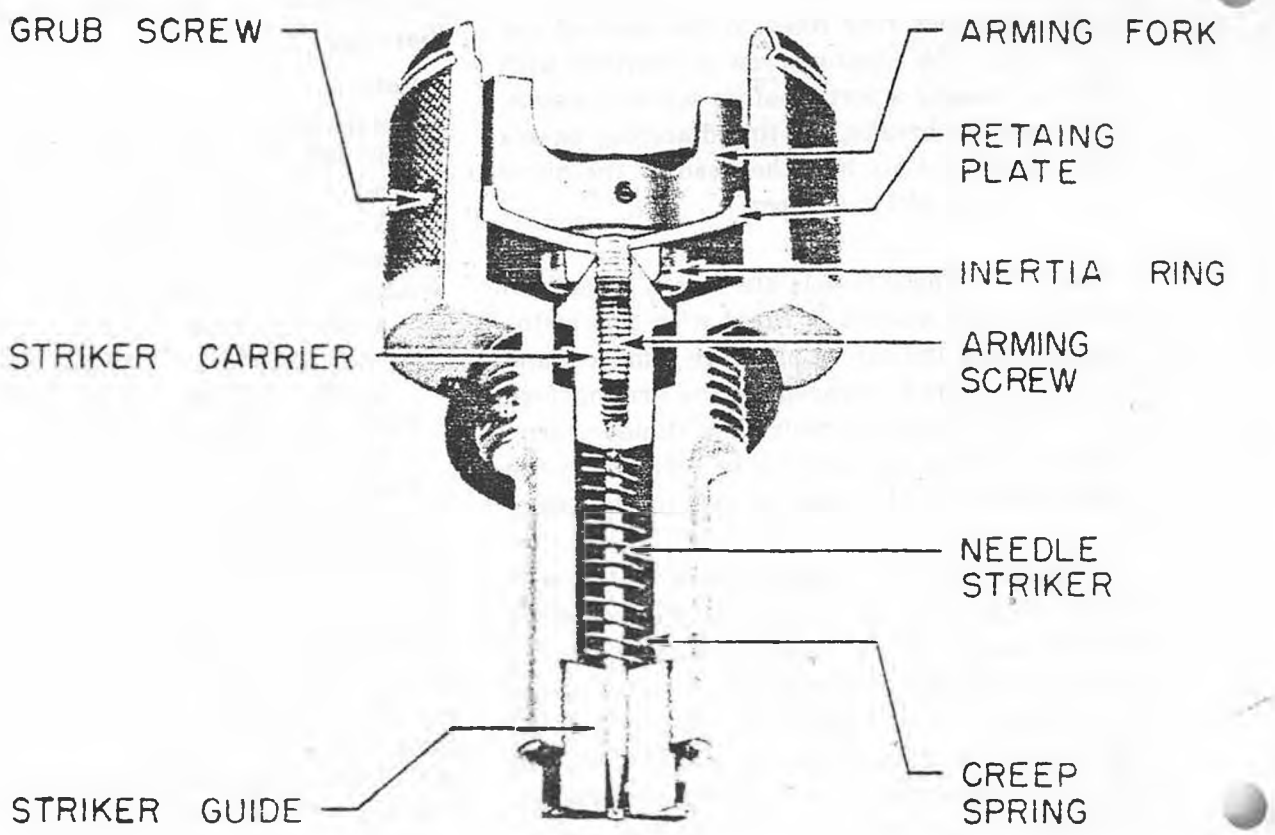

Figure 140—Tail Pistol No. 54 Mk I

Operation: When the bomb is released, the arming vanes in the tail cone rotate, and thread the arming fork and attached spindle upwards. After approximately 15 revolutions, the arming spindle is completely withdrawn from the striker head and inertia ring, and the striker head is now held up only by the creep spring. On impact, the striker head overcomes the resistance of the creep spring, and drives the needle striker into the detonator.

If the bomb lands on its side, the inertia ring moves sideways, bearing against the beveled top of the striker head and driving it downward against the creep spring, thus firing the detonator.

Remarks: The Pistol No. 54 Mk I has been developed to replace the Pistol No. 30 for low-level attacks, when the bomb may be expected to make side or angle impact. Although resembling the Pistol No. 28 externally, this pistol is considerably greater in diameter than the No. 28. It is restricted to employment in low-level bombing operations on fighter/bomber aircraft only. Therefore only sensitive-type detonators of 11 seconds delay or longer may be used.

Tail Pistol No. 60 Mk I is identical to the Pistol No. 54 Mk I, except that the arming spindle is considerably lengthened and the arming fork is replaced by a T-bar firmly attached to the top of the spindle.

Tail Pistol No. 58 Mk I (Service)

Data

Bombs used in.....D.P. 12,000-lb. and 22,000-lb.
Action.....Instantaneous on impact; may be used with detonators having delays up to 11 seconds
Armed condition.....When safety pin and arming wire are withdrawn
Fuzes used with.....None
Arming time.....Instantaneous on release
Body diameter .....2 in.
Over-all length .....3⅞ in.
Color .....Brass body

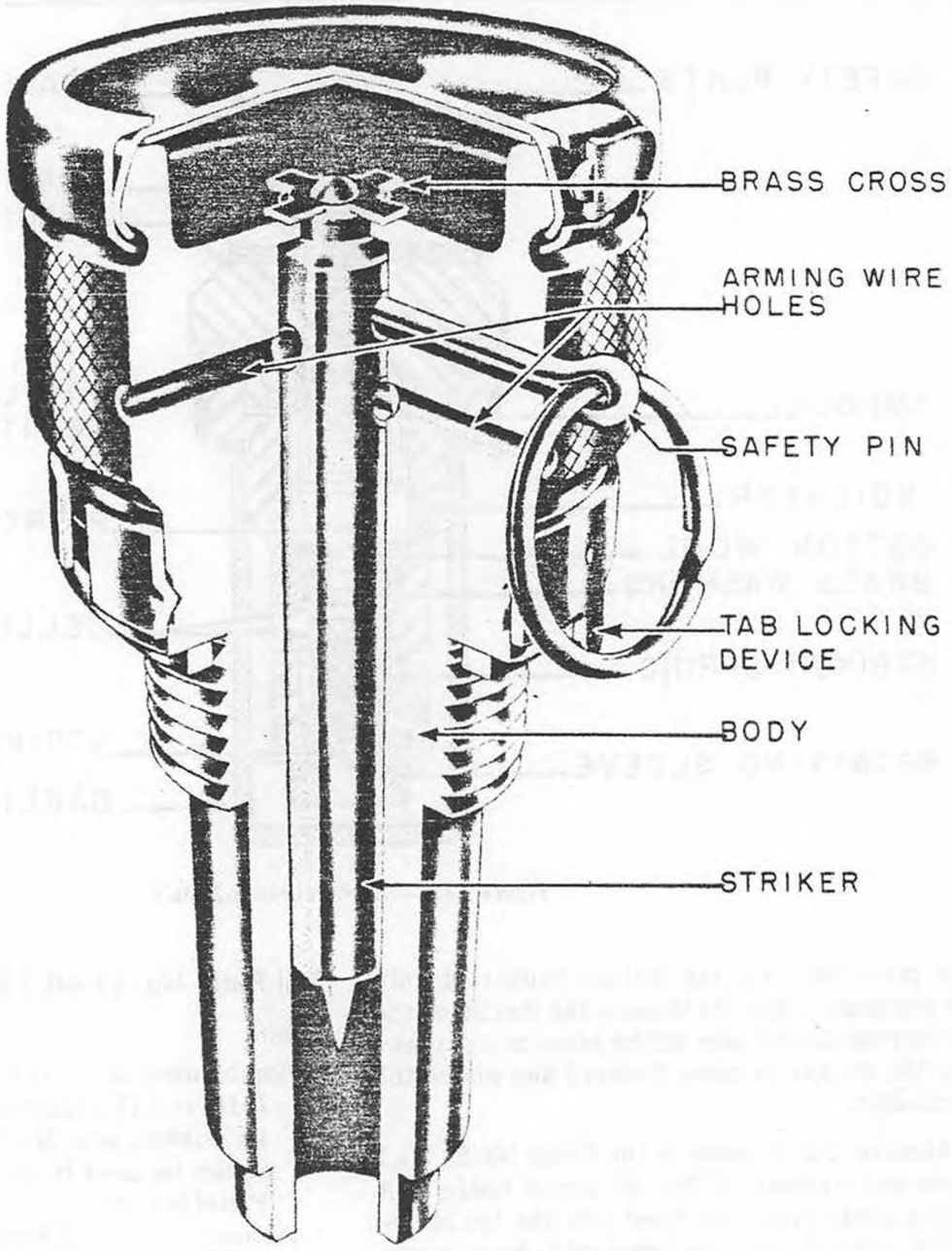

Figure 141—Tail Pistol No. 58 Mk I

Description: This pistol is a simple impact mechanism consisting of a brass body with a central channel to accommodate a heavy striker. The striker is retained by a small brass cross, which is fastened to the top of the striker by a copper pin. In the normal condition, the four tabs of the brass cross extend outwards over the top of the pistol body, preventing the striker from descending.

Two arming-wire holes are drilled in separate planes at 90° to each other. The hole to be used is that which gives the more favorable angle of pull-off for the arming wire from the pistol to the fuzing unit. Parallel to one of these arming wire holes, and about ¼ in. above it, is located a safety-pin hole.

Operation: When the bomb is released from the aircraft, the arming wire is withdrawn from

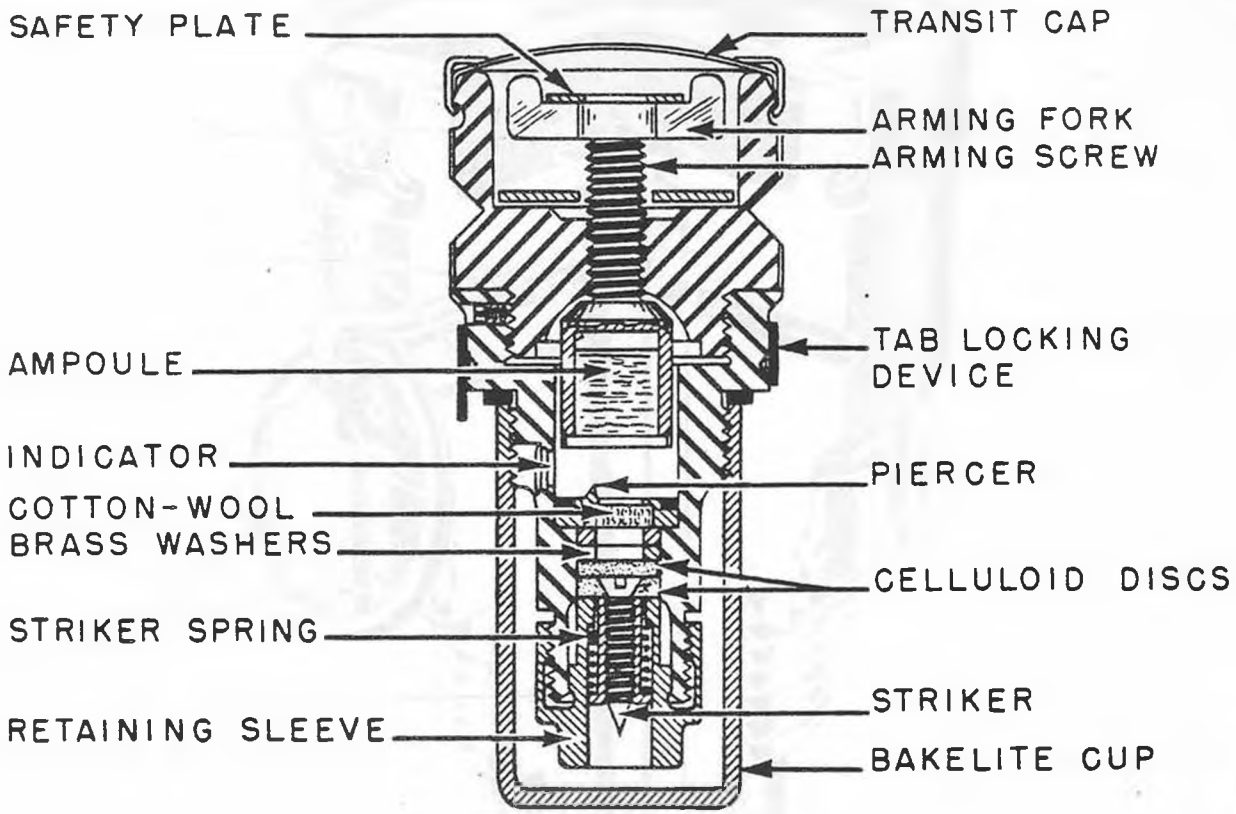

Figure 142—Tail Pistol No. 62 Mk I

the pistol, leaving the striker supported only by the brass cross. On impact, the inertia of the striker bends the tabs of the brass cross, allowing the striker to move forward and pierce the detonator.

Remarks: Early issues of the Pistol No. 58 Mk I were conversions of No. 30 pistol bodies. A heavy brass plug was fitted into the top of the pistol body and held in place with four screws. The later Mk I body is machined from one piece of brass. In addition, the early Mk I had a circumferential groove cut around the knurling on the outside of the pistol body similar to the one in the No. 30 pistol, except, that the groove was not painted green.

The use of this pistol is restricted to high-level bombing operations, as there is danger of non-functioning from low altitudes. Three of these pistols, located 120° apart in the base plate, are used with the D.P. bombs. The striker used with this pistol is of the needle type; thus only sensitive-type detonators can be used.

Tail Pistol No. 62 Mk I (Service)

Data

Bombs used in....G.P. 250- and 500-lb. Mks I, II, and IV, 1,000-lb., 1,900-lb. and 4,000-lb. bombs; and M.C. bombs. Theoretically it can be used in any bomb that takes the Pistol No. 30.

Action.....Chemical long delay of 6 to 144 hours

Armed condition.....Assume armed if dropped or if arming fork is threaded down to bottom of arming fork cavity in pistol

Fuzes used with.....None

Arming time.....8 vane revolutions, or instantaneous on impact if dropped from sufficient height to break acetone ampoule

Body diameter ..... 2 in.

Over-all length ..... 4.25 in.

Description: This is a chemical long-delay type tail pistol and does not incorporate an anti-withdrawal device.

It consists of a head, which accommodates an arming fork pinned to the screwed shank of a brass ampoule, and a body which houses a piercer, delay system, and striker assembly. The head is screwed into the top of the body and is locked by a set-screw. A device to indicate leakage of acetone is located in a hole drilled through the side of the pistol body, and consists of a yellow indicator paper which is visible through a perspex covering. Leakage causes the paper to burn blue.

The striker sleeve and assembly are located in the lower part of the pistol body beneath the piercer disc. The striker sleeve is secured by a retaining sleeve, which is screwed on and locked to the base of the pistol body. The striker assembly consists of a pointed screw and a collar. The screw is held in position by the screw head, which is engaged by a countersunk celluloid disc. The striker collar is internally threaded to receive the striker screw, and terminates in a flange at the lower end. The striker spring is held in compression by the flange of the striker collar and the striker sleeve.

Functioning: On clockwise rotation of the arming fork, the ampoule is screwed into the pistol body so that the piercer cuts out the thin ampoule disc. The acetone is released, and is absorbed by the cotton wool. The cotton wool then spreads the acetone evenly over the celluloid disc. When the celluloid is dissolved, the striker is released and moves forward under action of the striker spring to fire the detonator in the bomb.

Remarks: This pistol is similar to Tail Pistols No. 28 and No. 30 in external appearance, and resembles the Long-Delay Tail Pistols Nos. 37 and 53 in the fact that a V-shaped groove is cut around the pistol at the middle of the knurled head.

The delay depends upon the solvent action of acetone on celluloid disc. Alternative delays are obtained by varying the strength of the acetone, and/or the number of celluloid discs. In pistols giving the longer delays, the brass washers are replaced by incremental celluloid washers. Times of delay for specific pistols (at 60° F.) are engraved on the proper fuze body. The following list shows the delay as indicated after the letter following the fuze number: No. 62 Mk I, 6-hour delay; No. 62A Mk I, 12-hour delay; No. 62B Mk I, 36-hour delay; No. 62D Mk I, 72-hour delay; and No. 62E Mk I, 144-hour delay.

Special two-bladed arming vanes, colored white and of opposite hand to the normal type, must be used on the arming mechanism of bomb tail units fuzed with this pistol.

Depth-Charge Pistol Mk X** (Obsolete)

Data

Depth charges used in....Depth Charges Mk VII and Mk VIII
Action.....Hydrostatic; variable settings of 50, 100 and 150 feet
Armed condition.....No external evidence of arming
Body diameter ..... 3.48 in.
Over-all length ..... 16 in.
Color ..... Brass

Description: The depth adjuster comprises a cylindrical body in which is housed an orifice plate containing three leak holes of different sizes, corresponding to firing depths of 50, 100, and 150 feet. Located on top of the orifice plate are a strainer plate and an adjuster spring, which holds the strainer plate in position and the orifice plate on its seating. The orifice plate is mounted on a spindle, the lower end of which fits in a hole in the bottom of the adjuster body and is hollow and slotted to receive a safety rod. Fitted loosely on the upper end of the spindle is a spring barrel, an extension of which fits in a hole in the center of an adjuster cover. A pointer is secured to the spring-barrel extension, and both extension and pointer are slotted for the use of a winding tool. A pin in the bottom of the spring barrel projects through the strainer plate into a hole in the orifice plate. Coupled to the bottom of the spring barrel at its lower end, and to the adjuster cover at its upper end, is a torsion spring, which tends to rotate the orifice plate and the pointer in a clockwise direction.

The adjuster body is closed by the adjuster cover. Marked on the cover is the word SAFE, and the depth setting numbers 50, 100, and 150. At the side of the word SAFE is a hole to receive the safety stud, and beside each number, a hole for a stop pin. Three inlet holes in the cover allow water to enter the adjuster body. In the safe position the pointer is secured to the safety stud by a safety clip.

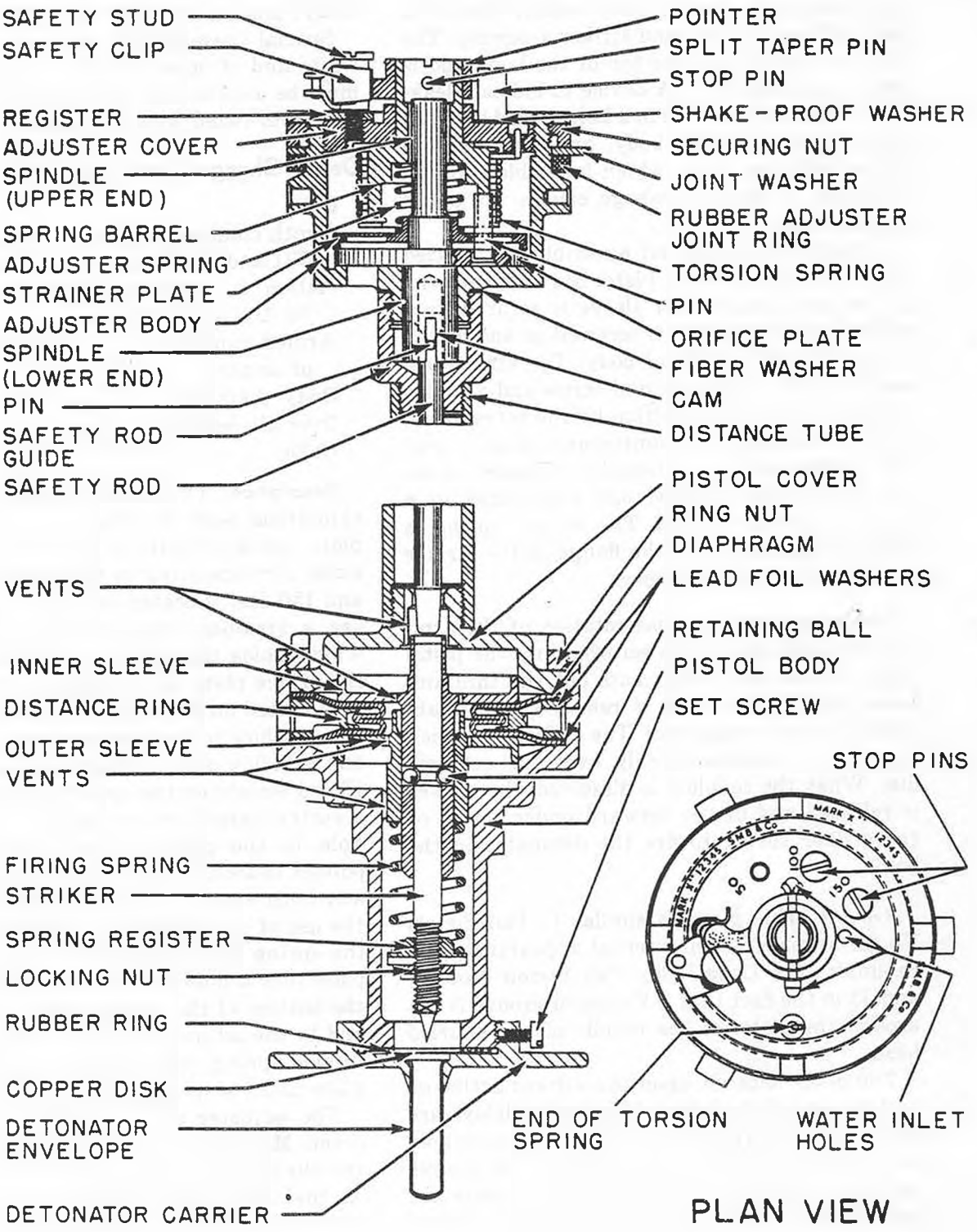

*Figure 143—Depth Charge Pistol Mk X***

In the bottom of the adjuster body is a hole which allows water to enter the primer tube of a depth charge, when any particular leak hole in the orifice plate is in line with it, but it is blanked by a plain section of the orifice plate when the depth adjuster is set at safe.

Screwed to a spigot on the bottom of the adjuster body is a safety-rod guide to which is screwed the upper end of the distance tube. This tube houses a safety rod, through the upper end of which is inserted a pin which engages in the slots in the orifice plate spindle and also with two cams formed on the spigot on the bottom of the adjuster body. When the depth adjuster is set on SAFE, the safety rod is held in the lowered position.

The pistol comprises a cylindrical body which houses a firing mechanism. The body is closed at the upper end by a pistol cover, which is screwed to the lower end of the distance tube and is secured in the pistol body by a ring nut. In the pistol cover and the pistol body, respectively, slide an inner and outer flanged sleeve, each sleeve having a hollow stem, the stem of the outer sleeve sliding over that of the inner. Between the flanges of the sleeves is a double-acting rubber diaphragm, the two discs of which are separated by a distance ring. Between each disc of the diaphragm and the distance ring is a lead-foil washer to prevent adhesion. The pistol cover, pistol body, and sleeves have air vents to equalize the internal pressure. The pistol body and distance ring both have six evenly spaced holes through which is transmitted the pressure which expands the diaphragm, thereby moving the sleeves in opposite directions. The fact that the inner and outer sleeves move in opposite directions to operate the firing mechanism renders the pistol inertia-proof, as no shock can produce these opposed motions simultaneously. The striker slides in the stem of the inner sleeve and is held cocked by two balls, located in the inner sleeve, engaging in a groove in the striker. When the depth adjusted is set on SAFE, the striker is prevented from moving upwards by the safety rod.

Operation: On release from the plane, the safety clip is pulled free by the fuze-setting control link. When the depth charge becomes submerged, water enters the adjuster body and passes through the strainer plate, the particular leak hole in the orifice plate, and the hole in the bottom of the adjuster body, to the primer tube, where pressure is built up. While the depth charge is sinking, the increased pressure is transmitted through the holes in the pistol body and distance ring to the two discs of the diaphragm, which begins to expand and move the sleeves and striker, compressing the firing spring. When the depth charge has sunk to its set depth, the two sleeves have moved through their maximum travel, and the balls are forced out into a recess formed in the stem of the outer sleeve, thereby releasing the striker, which fires the detonator.

Remarks: Some Depth-Charge Pistols Mk X** have an adjuster with holes drilled for 250, 350, and 500 feet. This pistol, though no longer used for aircraft depth charges, remains the standard depth-charge pistol for charges dropped by surface craft. An identical copy of this pistol has been developed and used by the Japanese.

Depth-Charge Pistols Mks XVI, XVI*, XIV and XIV* (Service)

Data

Depth charges used in.....Depth Charges Mks VII, VIII, XI, and XI*
Action.....Hydrostatic action; fixed setting for XVI and XVI* of 20-24 ft. and for XIV and XIV* of 14-18 ft.
Armed condition.....When safety fork is removed
Body diameter .....3.5 in.
Over-all length.....XVI and XVI*, 16 in.; XIV and XIV*, 15.8 in.
Color ..... Brass

Description: The depth-charge pistol consists of a valve unit, distance tube, and pistol mechanism. The valve unit is made of brass and is cylindrical, being threaded internally in the upper part to receive the valve cover; the lower end is also threaded externally to fit into the connector of the distance tube. A hole is drilled centrally through the valve cover in order to take the valve spindle. Around this hole are four smaller ones which act as water-entry ports. Around the upper end of the valve spindle there fits the safety clip, having flattened arms which cover the water-entry ports. On the lower end

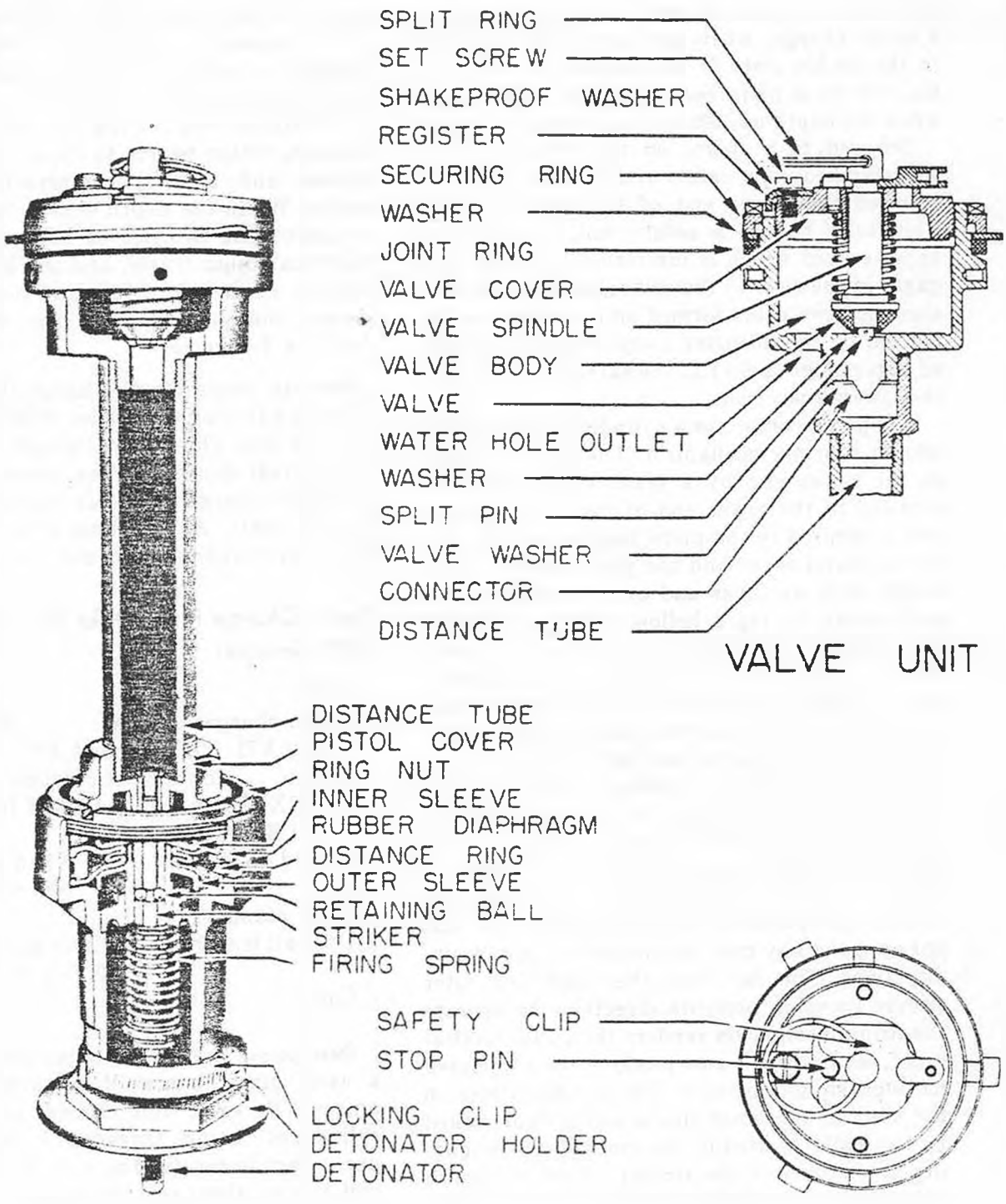

Figure 144—Depth Charge Pistol Mk XIV or XVI

of the valve spindle is a shoulder to which is seated a valve washer held on by a cotter pin. The washer seats on a shoulder of the lower valve body. Continual pressure is being exerted downward by the compressed valve spring, which rides between the valve cover and the shoulder on the valve spindle. The valve cover is held in place by a shakeproof washer and a set screw.

The pistol mechanism is cylindrical and fits into the primer tube. The pistol cover is held into the pistol body by a locking ring and is screwed into the lower end of the distance piece. Around the sides of the pistol body are drilled six water-entry ports. There are also entry ports in the brass distance ring which fits in the rubber diaphragm. This diaphragm fits between an inner and outer sleeve. The diaphragm is double acting and is separated from the distance piece by a lead-foil ring, which keeps it from sticking. In the inner sleeve are drilled two holes, which contain two retaining balls engaged with a grooved neck of the spring-loaded striker. The striker spring rests between a shoulder on the lower end of the striker and the outer sleeve, so that, as the diaphragm expands and moves the two sleeves apart, the striker spring is compressed. To the lower end of the pistol body are threaded the detonator carrier and detonator.

Operation: On release from aircraft, the safety clip is pulled, allowing the compressed valve spring to close the valve, and uncovering the water-entry ports. On water travel, water enters the holes in the upper valve body and passes out through those in the bottom of the valve cylinder into the primer tube. It then enters the water-entry ports in the sides of the pistol body and in the distance piece. This expands the rubber diaphragm and moves the inner and outer sleeves apart until, at the set depth, the balls in the inner sleeve are cammed out into a groove in the outer sleeve, and the compressed firing spring forces the striker into the detonator. When dropped safe, the safety clip covers the water-entry ports, preventing the entry of water into the primer tube. Leakage cannot cause the diaphragm to expand, because the valve is still up and pressure will be exerted on both sides of the diaphragm.

Remarks: The Mk XVI* is the same as the Mk XVI, except that it is modified to be secured more easily into the Depth Charges Mk VIII or IX, and an inertia safety clip is fitted. Also, the distance tube is sweated to the adjuster body to prevent leakage into the distance tube. The Mk XIV* has the same modifications of the Mk XIV as the Mk XVI* has of the Mk XVI.

Depth-Charge Pistols Mks XIX and XX (Service)

Data

Depth charge used in....Depth Charges Mks XI and XI* with a Tail Mk IV
Action....Hydrostatic; fixed settings of 20-24 ft. for the Mk XIX, and 14-18 ft. for the Mk XX
Armed condition.....No external evidence
Body diameter ..... 3.5 in.
Over-all length ..... 15.75 in.
Color....Brass valve and pistol assemblies; black distance tube

Description: The pistol and valve units are separated by a distance tube. The valve body is internally threaded to receive the valve cover, which is drilled centrally and tapped to accommodate the valve spindle. To the top of the valve spindle is fixed an arming fork, which engages a similar fork on the end of the reach rod of a standard British tail unit. On the lower end of the valve spindle is a shoulder to which is fitted a beveled rubber washer, secured to the shoulder by a cotter pin and fitting into the lower valve body. The valve cover screws into the valve unit and is held in place by a set screw.

On the lower end of the distance tube is located the pistol assembly. The cover of the pistol body is threaded to the distance tube and is held into the pistol body by a locking ring. Around the sides of the pistol body are six water-entry ports, extending through the distance piece, which fits into the rubber diaphragm. The diaphragm is located between an inner and an outer sleeve. In the inner sleeve are two holes containing retaining balls, which engage and retain the spring-loaded striker. The striker spring rests on a shoulder on the lower end of the striker and on the outer sleeve, so that as the diaphragm expands and the sleeves move apart, the striker spring is compressed. The detonator carrier is threaded to the lower end of the pistol body.

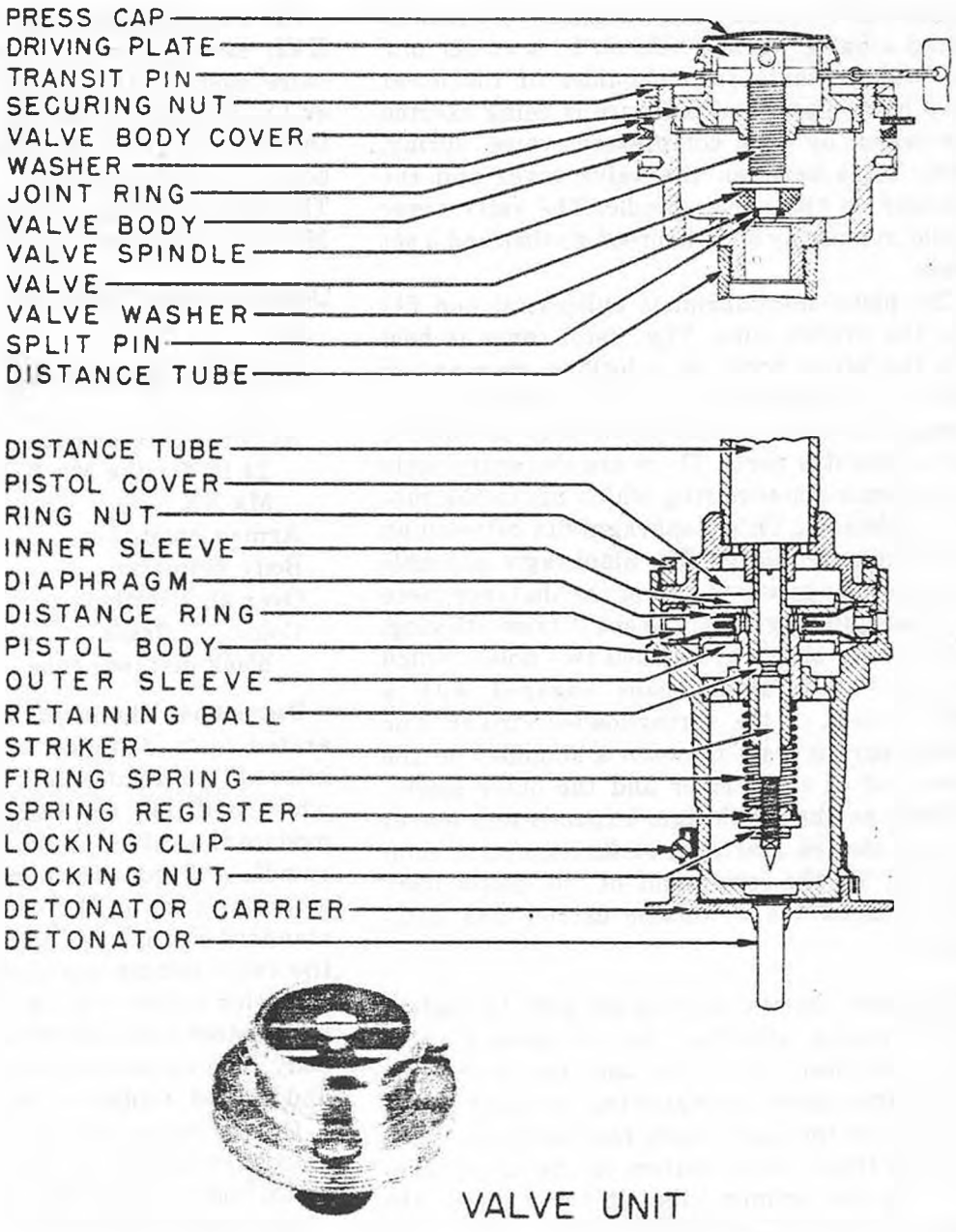

Figure 145—Depth Charge Pistol Mk XiX or XX

Operation: When the depth charge is dropped, the safety wire is pulled and the arming fork is rotated by the reach rod and the vanes. After about 11 revolutions of the vanes, the valve spindle has threaded the valve down onto the shoulder of the valve body, thus closing the valve and preventing water from entering the distance tube. After the depth charge enters the water, the water enters the water-entry ports in the top of the valve unit, and passes through to the primer tube. The water then enters the entry ports on the side of the pistol body and passes through the distance piece, causing the rubber diaphragm to expand. This moves the inner and outer sleeves apart. At the depth of 20-24 feet the sleeves have traveled sufficiently to allow the retaining balls to be cammed out into a shoulder in the outer sleeve. The compressed striker spring then forces the striker into the detonator.

OBSOLETE NOSE AND TAIL PISTOLS

Designation	Bombs Used In	Armed Condition	Functioning	Vane Span	Body Diameter	Over-all Length
Tail Pistols:						
No. 5B	R.L. 112-, 250-, 520-, and 500-lb.	Vanes off; red ring visible	Impact	4.6 in.	1.1 in.	4.0 in.
No. 12	S.N. 1,400-lb.	Vanes off	Impact	7.5 in.	2.0 in.	20.5 in.

Remarks: A safety wire is removed when the bomb is loaded aboard the plane, and the vanes are freed on release. The vanes and vane cap rotate off. On impact, the striker overcomes the creep spring and hits the detonator.

Nose Pistols:						
No. 8	R.L. 112-lb.and R.A.F. 500- and 550-lb.	Vanes off	Impact	6.0 in.	2.0 in.	4.9 in.
No. 9	R.L. 520- and 550-lb.	Vanes off	Impact	6.0 in.	2.0 in.	6.1 in.
No. 13	S.N. 1,400-lb.	Vanes off	Impact		2.6 in.	14.7 in.

Remarks: On Pistols No. 8, 9, and 13, a safety wire is withdrawn when the bomb is loaded aboard the plane, and the vanes are freed when the bomb is released. The vanes and vane cap rotate off, and on impact a shear wire is sheared, and the striker hits the detonator.

No. 14	H.E. Bombs	Vanes down; red ring visible	Impact	4.6 in.	1.9 in.	3.8 in.
No. 15	H.E. Bombs	Vanes down; red ring visible	Impact	4.6 in.	1.9 in.	4.3 in.

Remarks: On Pistols No. 14 and No. 15, the vanes are freed on release from the plane and screw the striker down. On impact, a pressure plate is driven down, shearing a shear wire, and forcing the striker into the detonator.

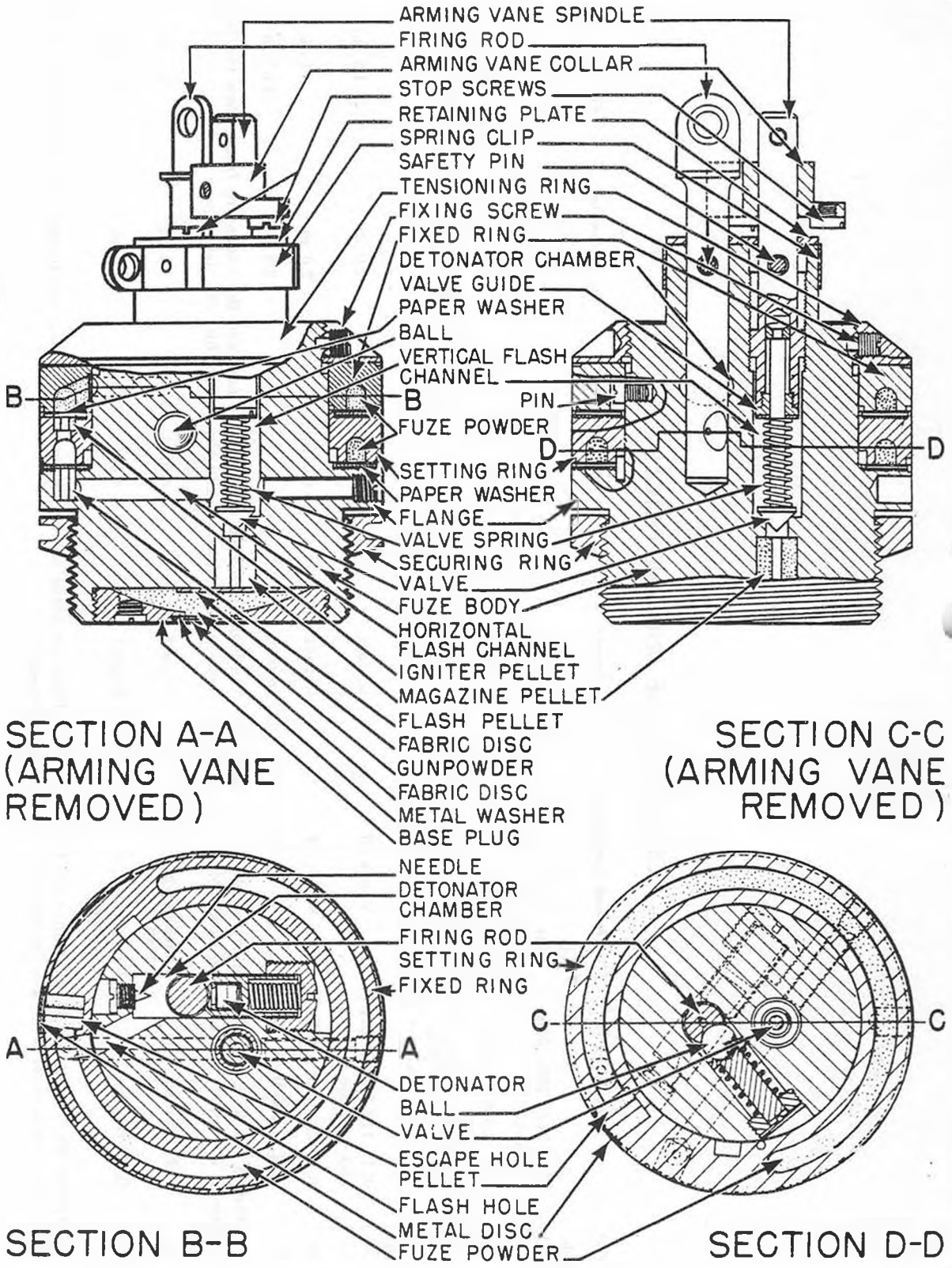

Figure 146—Nose Fuze No. 288

Part 2—Chapter 3

FUZES

Introduction

A fuze is a mechanical device which embodies certain arming and safety features and contains a small, integral explosive charge, whose main function is to initiate the main explosive system of the bomb in which it is used.

This chapter includes information on nose fuzes, tail fuzes, and fuzes which can be used in either nose or tail fuze pockets. It includes examples of direct impact, inertia impact, anti-disturbance, hydrostatic, barometric, and pyrotechnic aerial burst, and mechanical long-delay action fuzes.

For further information on fuzes see the Introduction to Part 2.

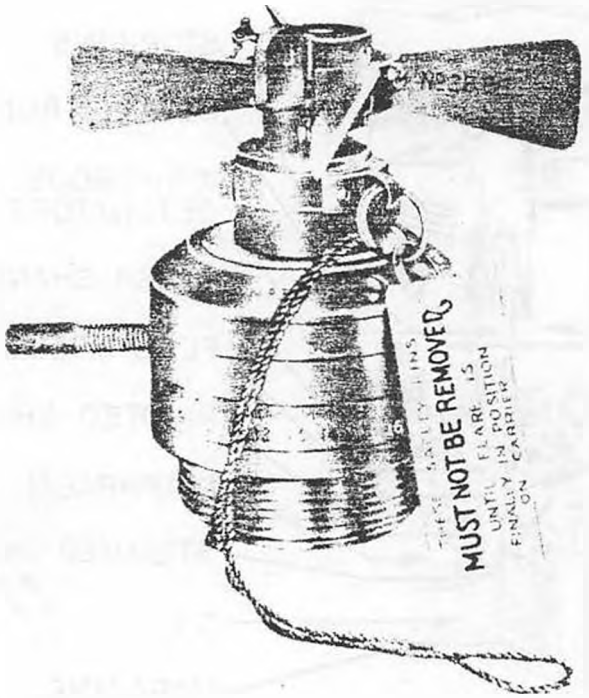

Figure 147—Nose Fuze No 288 Mk III

Nose Fuze No. 28B Mks II and III (Obsolescent)

Data

Bombs used in.....Flares and photoflash bombs
Action.....Pyrotechnic aerial burst
Armed condition....When safety-pin hole in arming spindle has risen ¼ in. above fuze body and firing rod has been withdrawn
Fuzes used with.....None
Arming time.....12 vane revolutions
Over-all length .....3.75 in.
Body diameter .....2.4 in.

Description: The No. 28B is a pyrotechnic delay, aerial burst fuze, with possible time settings from 0-22 seconds, although 7 seconds is generally the minimum employed. The fuze consists of a body, an igniting mechanism, a fixed ring and setting ring, each containing a pyrotechnic delay element, a valve mechanism to prevent premature functioning of the fuze, and a magazine containing a gunpowder charge for igniting the photoflash or flare unit.

The fuze body has a flange, on the upper surface of which the fixed ring and the setting ring rest. Below the flange the body is externally threaded for insertion into the flash or flare. A securing ring screws onto these threads and locks the fuze in position.

A spring-loaded detonator is housed in a chamber in the fuze body, opposite a fixed striker, and is held in position by the firing rod, movement of which is impeded by a spring-loaded ball engaging a groove in the rod. A flash channel extends from the detonator chamber to the delay element in the fixed ring.

The movable setting ring rests on a flange on the fuze body, and is placed below the fixed ring, which is secured by a screw to the fuze body. The delay elements are placed on the under surface of each ring in a circular groove, broken by a metal bridge. Communication between the grooves is effected by a hole in the top of the

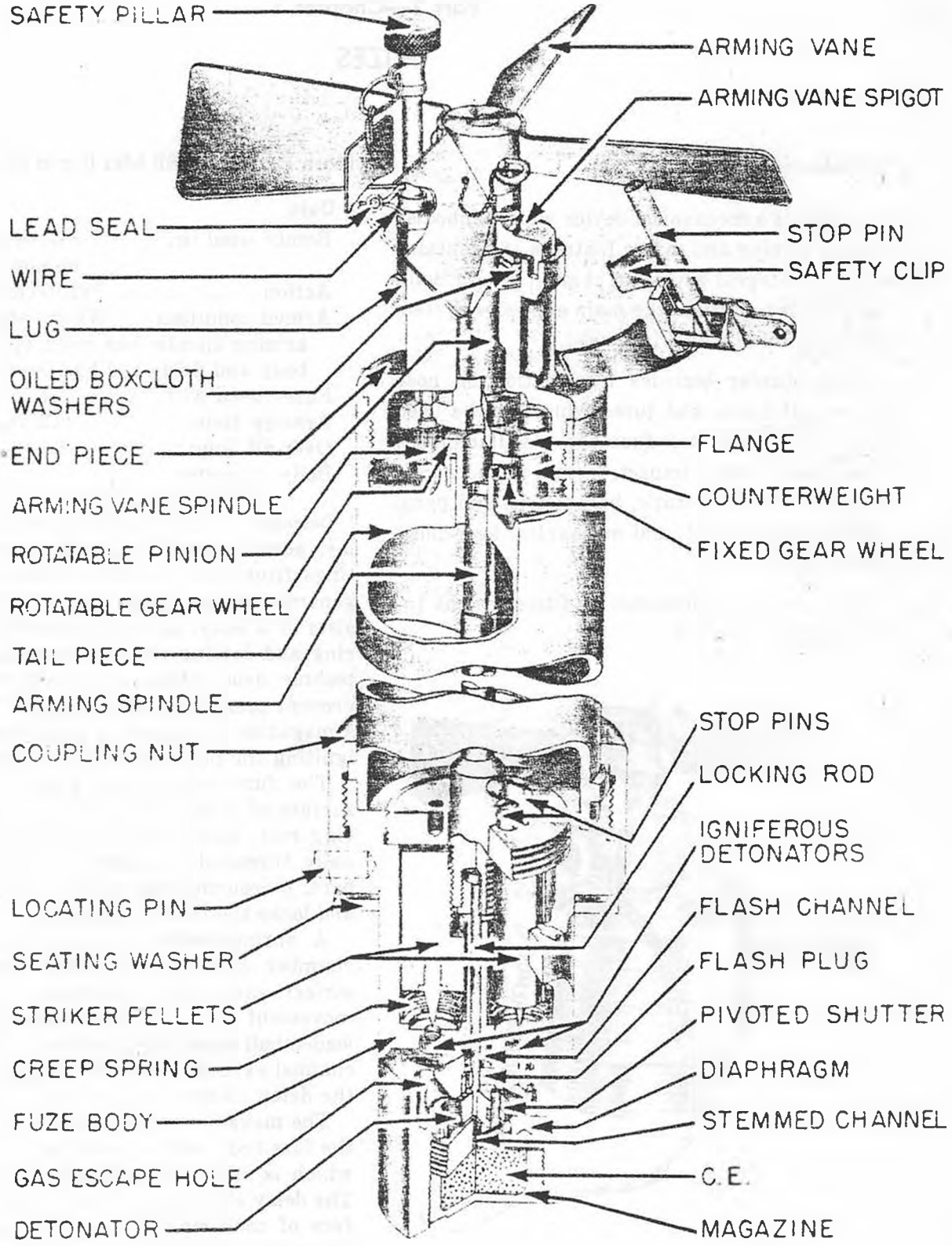

Figure 148—Tail Fuze No. 30 Mk II

setting ring. An igniter pellet is placed in the upper end of this hole, and, when the fuze is set on safe, this pellet is masked by the bridge on the fixed ring. When the fuze is set live, the setting ring is moved to a position where its delay powder is above a flash pellet, located in a hole in the body. This hole communicates with a horizontal flash channel, which opens into a vertical flash channel. Freedom of movement of the setting ring is restricted by a tensioning ring, which is locked in position by fixing screws.

A spring-loaded valve is located in the vertical flash channel, and is supported in a valve guide carried by a threaded arming-vane spindle. To the upper end of the spindle an arming-vane collar, with vanes attached, is secured by a split pin. Rotation of the spindle is prevented by the firing rod, part of which is located in a groove in the arming-vane collar. A retaining plate prevents the spindle and the arming vane from being separated from the fuze. To prevent the valve from binding if the vane should be rotated downwards, a stop screw in the vane collar can engage with a similar screw in the retaining plate.

Two safety pins connected to a spring clip prevent movement of the spindle and the firing rod when they are in place.

Operation: When the firing rod is withdrawn upon release from the plane, the spring-loaded detonator is released and forced against the fixed striker. The flash from the detonator passes through the flash hole and ignites the delay powder in the fixed ring. The delay powder burns for an interval of time determined by the position of the setting ring. At the end of this interval the igniter pellet in the setting ring is fired and ignites the delay powder in the setting ring. The delay train in the setting ring burns until it reaches the flash pellet, which is then ignited.

While the fuze powder has been burning, the arming van spindle has been rotating until the valve has been raised from its seating, so that, when the flash pellet is ignited, the flash can pass through the horizontal and vertical channels and ignite the magazine pellet. The pellet fires the magazine charge and ignites the flare or photoflash into which the fuze is inserted.

Remarks: This fuze is obsolescent, and is similar to early Fuzes No. 28 which are now obsolete. Although the fuzes are calibrated from 0-22 seconds, generally the numerals from 0 to 4 are painted out, and in some cases the numbers start at 4. In actual practice, no setting below 7 is authorized to be used, on account of the possibility of "blinds" or misfires.

Tail Fuzes No. 30 Mks I-III, and No. 37 Mk I (Service)

Data

Bombs used in.....No. 30, S.A.P. 250- and 500-lb. Mks II-IV; No. 37, A.P. 2,000-lb. Mks I-III
Action....0.1 sec. delay on impact; No. 30 Mk I only has additional special delay of 0.01 sec.
Armed condition.....No external indication
Fuzes used with.....None
Arming time.....480 vane revolutions (approx.)
Over-all length.....No. 30, 14.5 in.; No. 37, 23.3 in.
Body diameter.....No. 30, 2.75 in.; No. 37, 2.75 in.
Color....No. 30, brass and unpainted metal; No. 37, black

Description: These fuzes are fundamentally the same, the principal difference between the No. 30 and No. 37 being in length, and the fact that, because of its additional length, the No. 37 arming spindle is fitted with two universal joints. The No. 30 Mk II fuze body is of tubular section and is externally threaded at one end to receive a coupling nut, which secures a tubular tail piece to the fuze body. Screwed into a flange on the fuze body is a locating pin for insertion into the slot in the exploder container of the bomb. The lower end of the fuze body is closed by a C.E. filled magazine, which has a thin bottom wall. The upper end of the magazine is closed by a diaphragm having a firing channel communicating with the magazine, the channel being stemmed with C.E.

An arming vane is secured to the end of the arming-vane spigot, and a flanged arming-vane spindle supports a rotatable pinion and counterweight. The pinion meshes with two gear wheels, one fixed to the tail piece and having 59 teeth,

the other engaging the arming spindle and having 60 teeth. Secured to the arming spindle is a locking rod projecting into and retaining a pivoted shutter in the unarmed position. The shutter contains a detonator, and has a spring which forces it about its pivot to line up with the firing channel when the locking rod is withdrawn.

The fuze has two identical delay mechanisms, each consisting of a striker, a creep spring, an igniferous detonator, a delay pellet, and an adjoining powder pellet, so positioned that the powder pellet extends over a flash channel, and that one end of the delay pellet adjoins a firing hole, which opens into the bottom of the striker chamber. The strikers are retained in the unarmed position by the arming spindle, which is screwed into the sides of the strikers. Stop pins prevent the arming spindle and the strikers from jamming.

Operation: When the fuzed bomb is released, the safety clip is pulled free and the arming vanes rotate. The pinion is revolved around the fixed and rotatable gears, and, because of the difference in the number of teeth, rotates the movable gear and hence the arming spindle once every 60 vane revolutions. As the arming spindle is rotated, it unthreads from the strikers and draws the locking rod out of the shutter. When the locking rod clears the shutter, its spring forces it about its pivot, aligning the detonator with the firing channel. The shutter is locked in this position by a pivoted, spring-controlled locking pawl, which snaps into position behind the shutter. The pawl is locked by a spring-actuated plunger, which moves down into a groove in the pawl. As the arming spindle clears the strikers, it slides upwards through the rotatable gear wheel. The fuze is now armed.

On impact the strikers move down, overcoming the creep springs, and fire the igniferous detonators. The flashes from the detonators pass through the firing holes and ignite the delay pellets, which in turn ignite the power pellets. The flashes from the powder pellets pass through the flash channel and the flash plug, and ignite the detonator, which, by detonating the C.E. in the stemmed channel, fires the C.E. in the magazine. Impact of the fuzed bomb with the the light superstructure of a ship, or with the surface of the sea, is sufficient to cause the fuze to function.

Remarks: The Fuze No. 30 Mk I includes a special and a normal delay. The arming mechanism is the same, but the delay mechanism differs in that the striker for the special delay is supported by a shear wire when released by the screwed arming spindle. There is no creep spring beneath this pellet. The normal delay activates the fuze as described above, but the special delay functions when the fuzed bomb strikes one-inch mild steel plate with a velocity of 500 ft. per sec. When this occurs, the wire supporting the striker is sheared, and the striker moves against, and fires, the igniferous detonator below it. The flash from the detonator passes through the firing hole to the delay pellet, which ignites the powder pellet. The flash from the powder pellet passes through the flash channel and the flash plug and ignites the detonator, which fires the C.E. in the magazine by detonating the C.E. in the stemmed channel.

The No. 30 Mk I* is the same as the Fuze Mk II, above. The No. 30 Mk III is similar to the Mk II, except that it is fitted with a stirrup and a packing washer, and has a fork secured the safety clip to press the arming-vane spigot firmly against the packing washer to form a water-tight joint while the fuzed bomb is being taxied over water.

Nose Fuze No. 32 Mks II* and III (Obsolescent)

Data

Bombs used in....AS. 250-lb. Mks I-III and AS. 500-lb. Mks I-III
Action....Instantaneous on impact, or delay of 0.5, 1.0, 1.5, or 2.0 seconds
Armed condition.....No external evidence
Arming time.....200 ft. of air travel at 100 m.p.h.
Body diameter .....2.5 in.
Over-all length .....7.0 in.
Color.....Aluminum and brass; may be painted black over-all.

Description: This fuze consists of a two-piece body, the upper part of which is aluminum, and the lower brass. The lower body is cylindrical, while the upper body is sloping. Through the upper body extend the vane hub and arming vanes, and on the sides are attachments for the safety pillar and the safety wire. On the lower

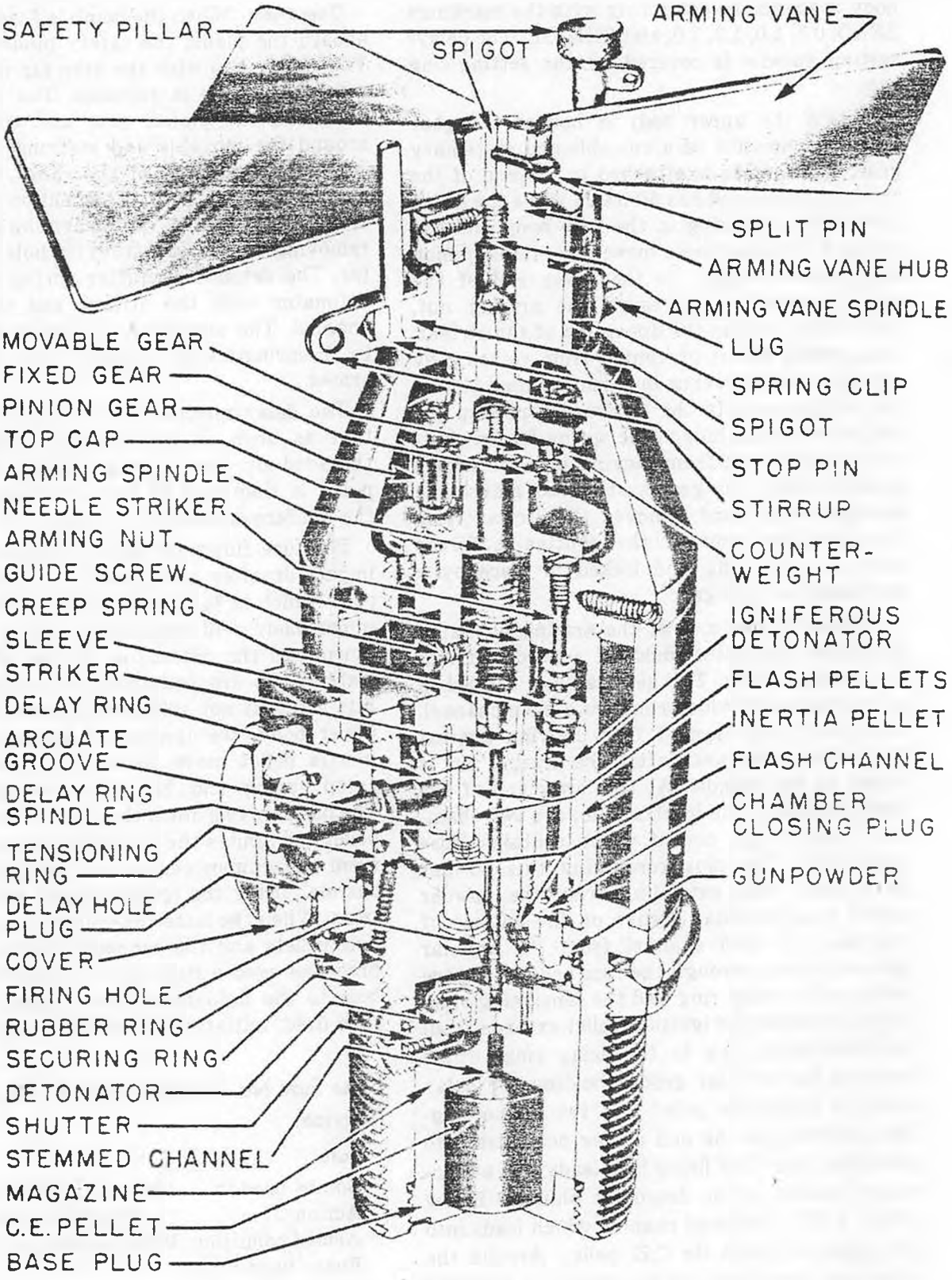

Figure 149—Nose Fuze No. 32

body is found the delay ring with the markings ZERO, 0.5, 1.0, 1.5, 2.0, and BRIDGE. The delay-setting spindle is covered by the setting-ring cap.

Within the upper body is housed the gear system, consisting of a movable and stationary gear. The former is attached to the end of the arming spindle and has 60 teeth, while the latter is fixed to a bearing in the fuze body and has 69 teeth. Around these move a rotatable pinion and counterweight. To the lower end of the arming spindle is threaded the arming nut, into which is fitted the upper end of the striker. The arming nut is prevented from rotating by a guide screw, moving in a longitudinal slot in the arming nut. In the unarmed condition the striker rests in a hole in the spring-loaded shutter, preventing it from moving into the armed positon. When the gear system has moved the arming nut up and removed the striker from the detonator shutter, the shutter is forced over by its spring and locked in place by a spring-loaded plunger.

Located to one side of the arming nut is an igniferous detonator, held off a needle striker by a creep spring. This detonator is carried in an inertia pellet, which contains a flash channel. The pellet is prevented from moving against the creep spring until after the arming nut is raised on the spindle. At the lower end of the flash channel in the inertia pellet are two chamber-closing plugs, one of which contains loose gunpowder. The plug containing this powder has radial holes extending from the powder cavity to an annular groove on the outside of the plug. A flash channel from the annular groove extends through the fuze body to a space between the delay ring and the tensioning ring. A hole housing the ignition pellet extends from the tensioning ring to the delay ring, which contains the circular groove holding the delay train. A flash-hole pellet and two connecting-hole pellets join the end of the delay train to the firing hole. The firing hole leads into a detonator located in the detonator shutter. Below this is a C.E. stemmed channel which leads into the magazine with its C.E. pellet. Around the threaded lower body of the fuze is a securing ring, above which a rubber ring is located to afford a watertight seal in the bomb.

Operation: When the bomb is fuzed and loaded aboard the plane, the safety pillar is removed. The safety clip with the stop pin is pulled free when the bomb is released. The vanes rotate and turn the pinion gear and counterweight around the movable and stationary gears. For each sixty rotations of the vanes, the movable gear is rotated once. This action threads the arming nut upwards on the arming spindle, thus removing the striker from its hole in the shutter. The detonator shutter spring lines up the detonator with the striker and the stemmed channel. The shutter is locked in this position by a spring-loaded plunger. The fuze is now armed.

The delay mechanism is in operative condition as soon as the arming nut has been threaded up the arming spindle. The inertia pellet is then free to move forward and force the igniferous detonator against the striker.

The fuze functions either instantaneously on impact or after a set delay. If it strikes steel plate which is ⅜-in. or thicker, the sides of the upper body will crush and force the striker down into the detonator. If the fuze hits the water when dropped from 500 to 4000 feet, or hits a target not sufficiently hard to crush the upper body, the igniferous detonator and the inertia pellet move forward, compressing the creep spring and hitting the needle striker. The flash travels down the channel in the inertia pellet and ignites the loose gunpowder. The flash from the gunpowder passes through the flash channel, firing the ignition pellet and the delay train. When the latter has burned out, the flash-hole pellets and the connecting-hole pellets are fired and send a flash down through the firing hole to the detonator. The magazine pellet is then fired, initiating the explosion of the bomb.

Nose Fuze No. 35 Mks I, I*, II, II*, III, and IV (Service)

Data

Bombs used in....4.5 in. reconnaissance flare
Action .....Pyrotechnic aerial burst
Armed condition.When safety pin is removed
Fuzes used with .....None
Arming time .....Instantaneous
Body diameter .....2.36 in.
Over-all length .....3.4 in.

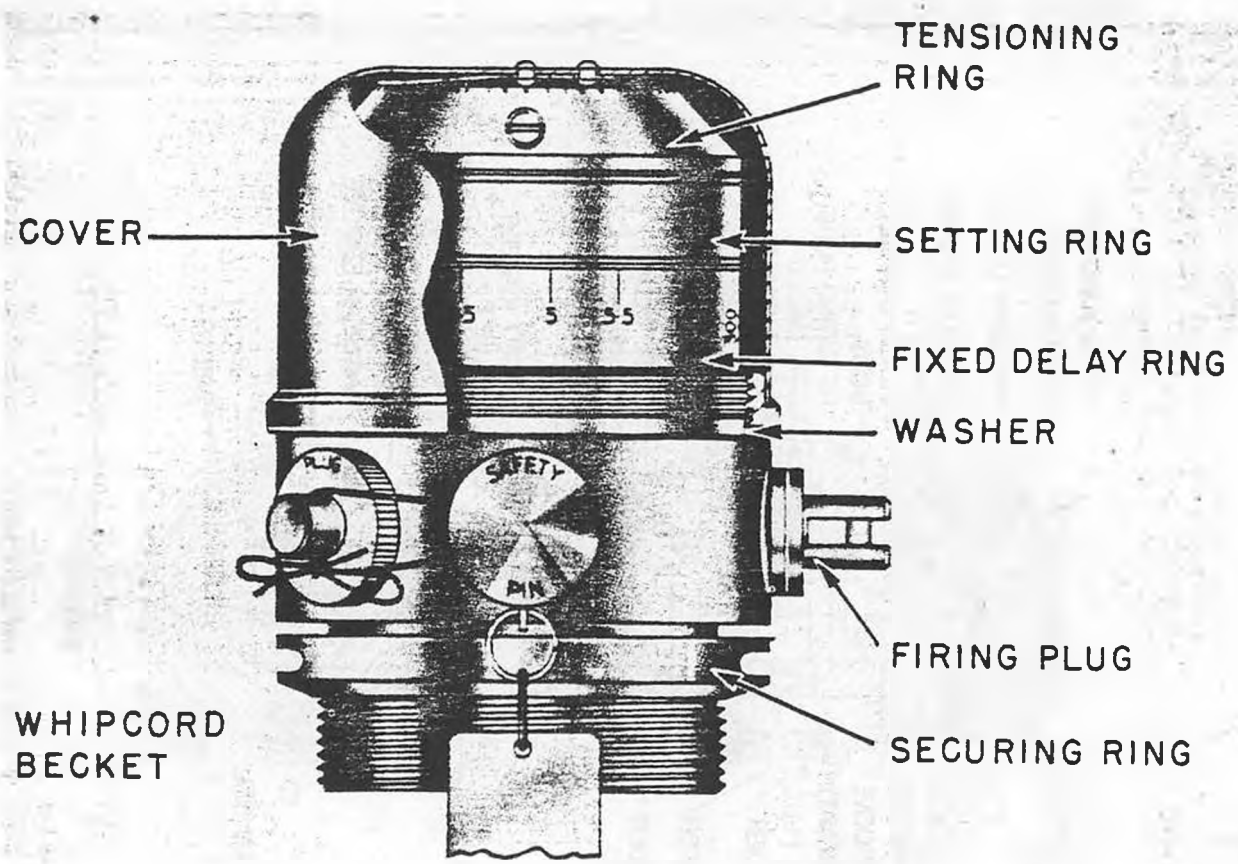

Figure 150—Nose Fuze No. 35 Mk IV

Description: Fuze No. 35 Mk IV consists of a body containing an igniter mechanism, a delay system, a setting ring, magazine charge igniters, and a magazine holding a gunpowder charge. The igniter mechanism comprises a spring-loaded striker and a detonator located in a horizontal channel in the fuze body. The striker is held in a firing plug by two retaining balls which engage an annular groove of the striker. The firing plug protrudes from the fuze body, and is attached to the aircraft by a fuzing link. A safety pin, screwed into the body, retains the striker in the safe position.

The delay system consists of a quantity of delay composition contained in two grooves cut into the upper and lower surfaces of the fixed-delay ring. A bridge of metal separates the ends of each groove, and a long pellet connects the grooves. The powder in the lower groove provides a fixed minimum delay period and communicates with a firing channel located between the detonator and the exhaust plug. The fixed-delay ring is secured to the fuze body by a locating pin. Its outer surface is graduated in hundreds of feet up to 800, and thereafter in thousands of feet, representing the distance of fall before the magazine is fired.

The setting ring, on which a red setting arrow is marked, contains two short igniter pellets. A hole leads from the upper pellet to an annular groove formed in the ring. This groove is aligned with an annular groove cut in a spigot, which is screwed into the fuze body. A number of long igniter pellets, arranged in the form of a cross in the spigot, communicate with the groove in the spigot. A flash channel leads down from the center of the cross, through the spigot, and into another flash channel in the fuze body. The latter channel leads to the magazine. A tensioning ring, locked in positon with grub screws, determines the ease with which the setting ring may be rotated.

The magazine consists of an apertured magazine cover held in position by a base plug, which

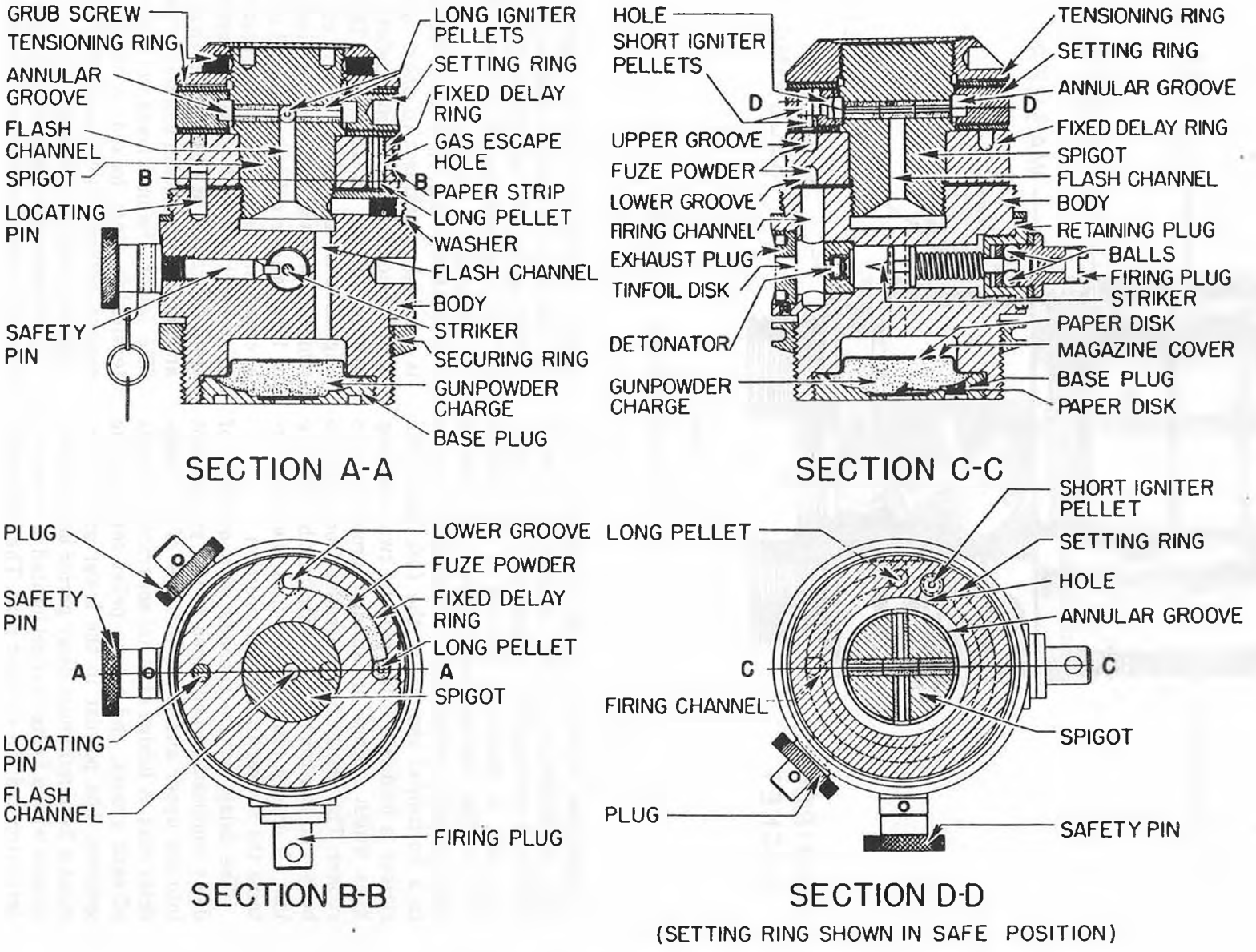

Figure 151—Nose Fuze No. 35 Mk IV

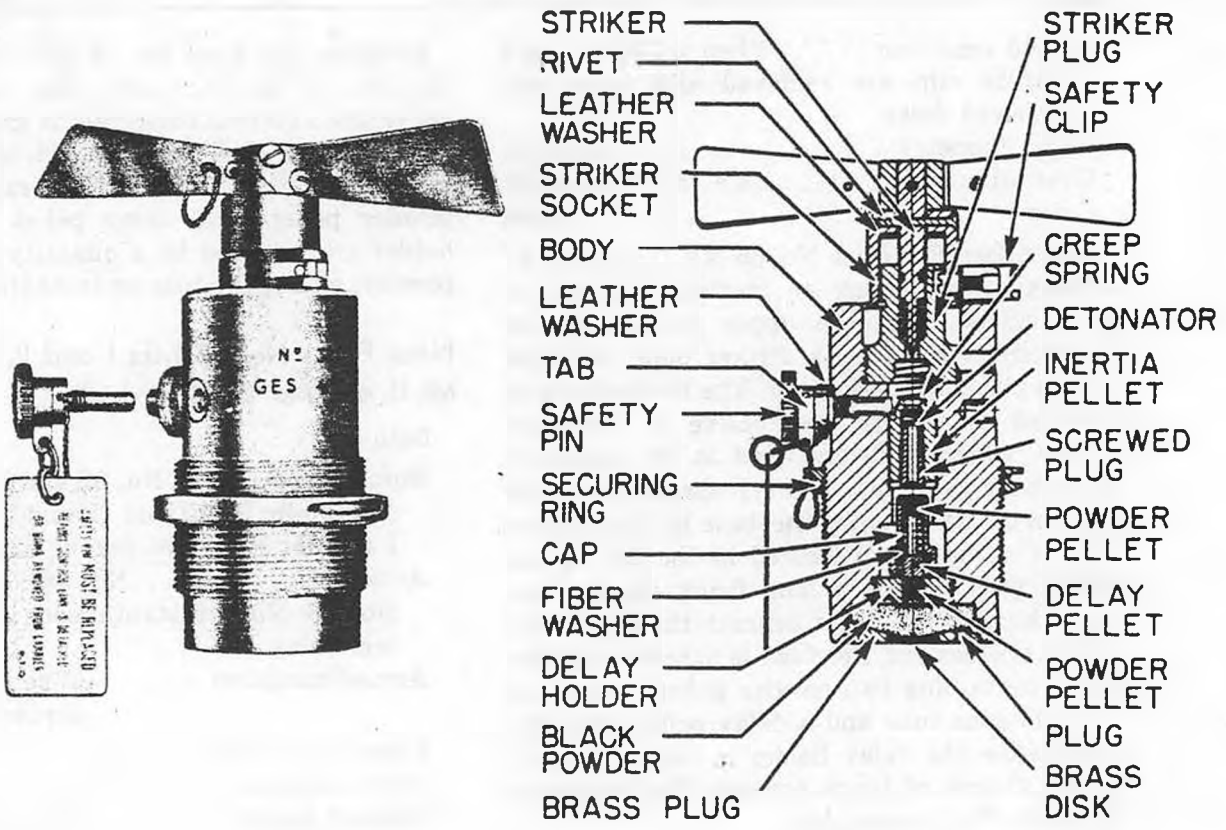

Figure 152—Nose Fuze No. 36 Mk II

is screwed into the bottom of the fuze body. A paper disc covers the aperture in the magazine cover, and a hole leading out of the base plug is sealed with another paper disc. The magazine contains a gunpowder charge of about 30 grains.

Operation: The safety pin is removed manually when the flare is loaded aboard the aircraft. The firing plug is withdrawn upon release, pulling back the striker against its spring until the two balls are clear of the retaining plug. The balls then fall away, and the striker is forced by its spring against the detonator.

The flash passes up through the firing channel and ignites the powder in the lower groove of the fixed-delay ring. This fires the long pellet connecting the upper and lower grooves, which in turn ignites the powder in the upper groove. After a time interval determined by the position of the short igniter pellets in the setting ring, these pellets are fired by the powder in the upper groove. The flash from the short igniter pellets passes through the hole communicating with the annular grooves in the setting ring and spigot, and ignites the long igniter pellets in the spigot. The flash from these pellets passes downward through the flash channels in the spigot and the fuze body, and fires the gunpowder charge in the magazine.

Remarks: Fuze No. 35 Mk I is identical to the Mk IV, except that the fixed-delay ring is graduated from 3½ to 17, representing seconds of delay. The magazine contains 50 grains of gunpowder. The No. 35 Mk I* is identical to the Mk I, except that the gunpowder charge is reduced to 30 grains. The No. 35 Mk II is identical to the Mk IV, except that the gunpowder charge in the magazine is 50 grains. The No. 35 Mks II* and III are substantially identical to the Fuze Mk IV.

Nose Fuze No. 36 Mks I and II, and No. 36 N.D. Mk II (Service)

Data

Bombs used in .....I.B. 250-lb. Mks I and II
Action .....Instantaneous or short delay on impact

Armed condition .....When safety pin and safety clip are removed and vane hub screwed down
Body diameter .....1.8 in.
Over-all length .....4.8 in. (Unarmed)
Color .....Brass

Description: The Fuze No. 36 Mk II consists of a brass body housing an inertia pellet and a creep spring. Into the upper portion of the fuze body is threaded a striker plug, which is held in place by a set screw. The striker plug is threaded internally to receive a threaded striker, which is firmly fixed to the inside of the arming-vane hub. A creep spring separates the inertia pellet from the base of the striker plug. A detonator is located in the top of the inertia pellet, while a long firing channel extends through the pellet beneath the detonator.

Into the base of the fuze is screwed a delay holder containing two powder pellets separated by a distance tube and a delay pellet. Immediately below the delay holder is located an initiating charge of black powder. The fuze base is closed with a base plug.

Safety during transit is provided by a safety pin, inserted in the side of the fuze body, which engages the top of the inertia pellet and prevents it from moving upward against its spring. In addition, a safety clip fits around the vane hub, and a stud in the clip passes through the vane hub into a locating hole in the striker plug to prevent the vane hub from rotating.

The fuze body is threaded externally for insertion in the bomb, and a securing ring is provided to lock the fuze in position.

Operation: The safety pin is removed from the fuze when the bomb is loaded aboard the plane, and a plug, normally located in a blind hole in the fuze body, is placed in the safety-pin hole to seal the fuze. The safety clip is pulled away when the bomb is dropped, and the vanes are free to rotate the vane hub, screwing the striker down and exposing its sharp point. On impact the inertia pellet moves against the creep spring, bringing the detonator into contact with the striker. The explosion of the detonator initiates the powder pellet, delay pellet, and second powder pellet, located in the delay holder. The second powder pellet fires the initiating gunpowder charge, which then initiates the Ejection Charge No. 2 Mk I in the bomb.

Remarks: The Fuze No. 36 Mk I is identical to the No. 36 Mk II, except that the fuze body above the external threading is greatly reduced in diameter. The Fuze No. 36 N.D. Mk II is identical to the No. 36 Mk II, except that the powder pellets and delay pellet in the delay holder are replaced by a quantity of loose gunpowder, giving the fuze an instantaneous action.

Nose Fuzes No. 38 Mks I and II, No. 38 N.D. Mk II, and No. 864 (Service)

Data

Bombs used in ....No. 38 and No. 38 N.D.—L.C. 30-lb. Mks I and II, and I.B. 30-lb. Mks I and II; No. 864—Smoke 120-lb.
Action .....No. 38, 0.5 sec. delay; No. 38 N.D., instantaneous; No. 864, 2.5 sec. delay
Armed condition .....When the striker is screwed down
Fuzes used with .....None
Body diameter .....2.25 in.
Over-all length .....5.5 in. (striker)
Color .....Brass

Description: The Fuze No. 38 Mk I consists of a cap, body, and base piece. In the cap is screwed the needle striker, which is locked by a lock nut. Below this is a ferrule whose tabs support a creep spring, which holds down an inertia pellet containing the detonator. A flash channel below the detonator in the inertia pellet leads to the delay element and the magazine.

Operation: When the bomb is put in the plane, the lock nut is loosened, the striker is screwed down, and the lock nut is then retightened. The fuze is now armed. Upon impact, the inertia pellet overcomes the creep spring and carries the detonator against the striker. The flash ignites the delay element, which in turn fires the magazine.

Remarks: The Fuze No. 38 Mk II differs from the Mk I in that it does not have the strengthening collar to meet conditions of oblique impact. This is also true of the Mk II N.D. The No. 38 N.D. Mk II has gunpowder in place of the delay element. The Fuze No. 864 Mk I differs from the No. 38 by having a smaller magazine.

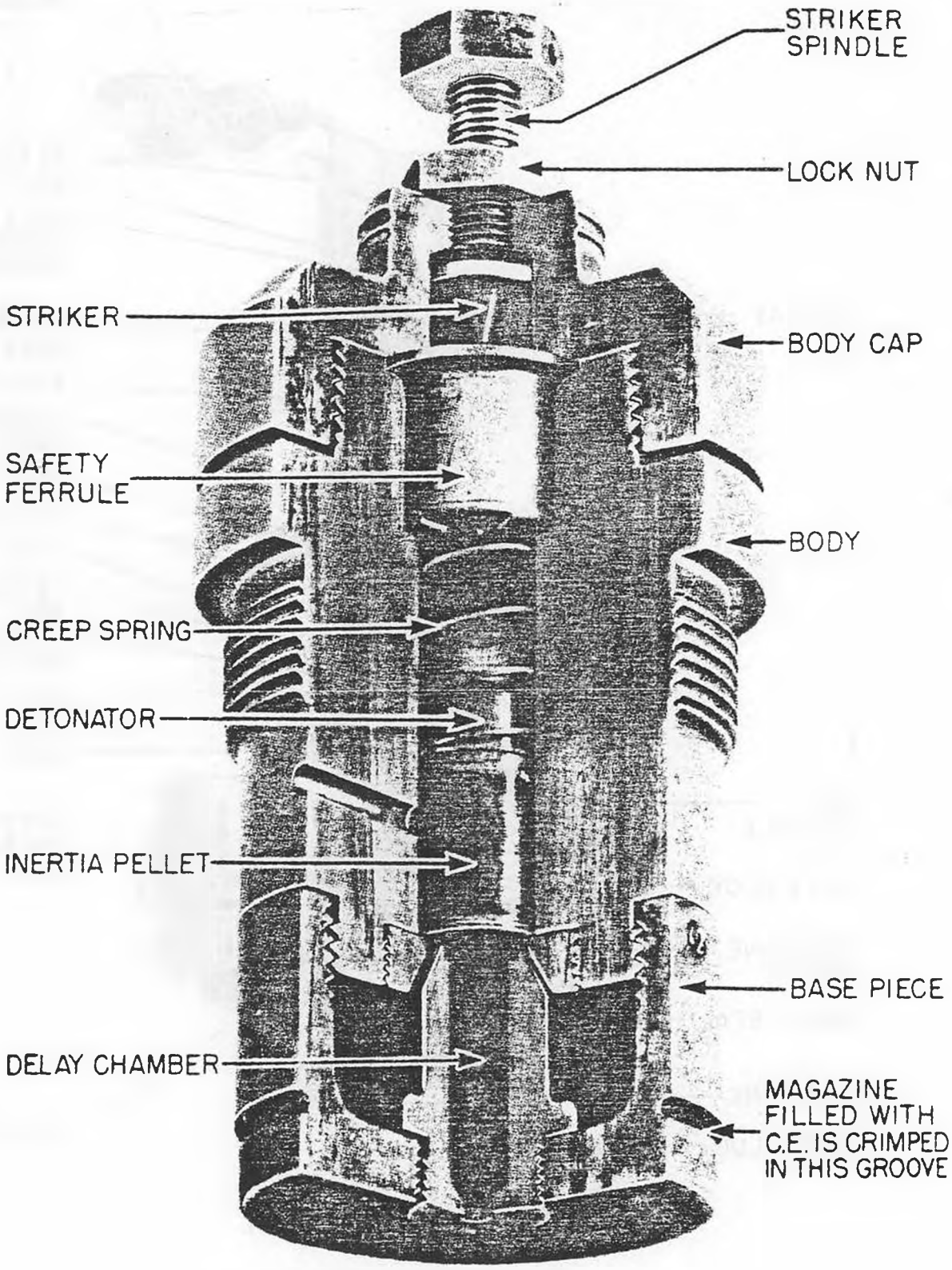

Figure 153—Nose Fuze No. 38 Mk I

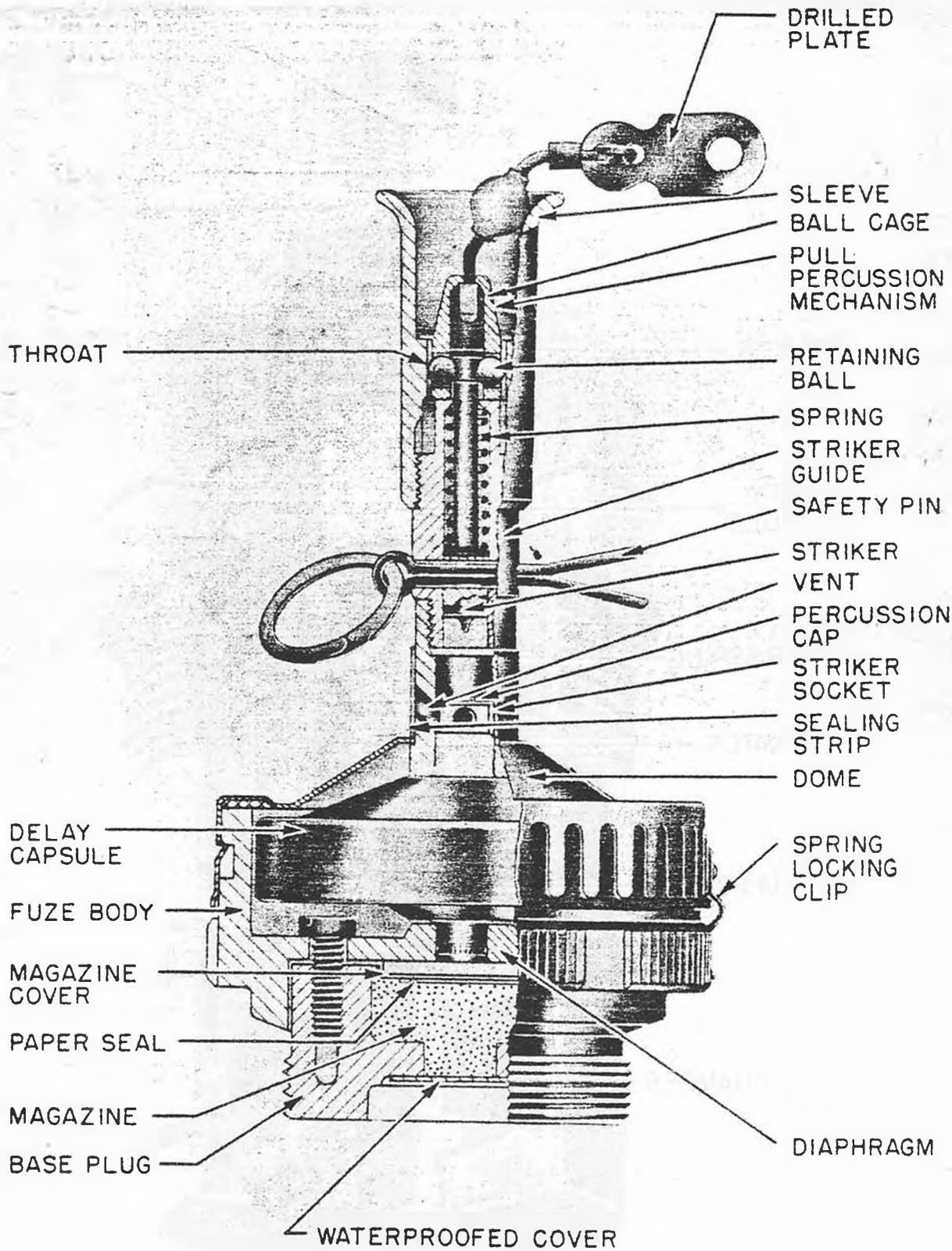

Figure 154—Nose or Tail Fuze No. 42

Nose or Tail Fuze No. 42 Mks I-IV (Obsolescent)

Data

Bombs used in ....4.5-in. flare, 5.5 in. flare, Cluster No. 1 Mk I, Cluster No. 14 Mk I, and Clusters No. 15 Mk I and Mk II
Action .....Pyrotechnic aerial burst
Armed condition .....When safety pin is removed
Armed time .....Fired on release from plane
Body diameter .....3.0 in.
Over-all length .....5.25 in.
Color .....Brass throat and aluminum fuze body

Description: The fuze consists of a brass throat attached to an aluminum upper fuze body, and a cast lower fuze body. The upper body is attached to the lower body by means of a bayonet joint. The base piece containing the magazine is attached to the lower fuze body by three screws. Located in the throat is a pull percussion mechanism consisting of a drilled plate attached to a ball cage by a length of cord. The ball cage contains two retaining balls, which engage in a groove in the striker and bear against the wall of the throat. A safety pin passing through the striker and the throat is removed just before the bomb is loaded aboard the plane. The striker is spring-loaded downwards, and under it is located the primer, which leads to the delay train. The delay element is housed in the delay capsule in the lower fuze body. In the safe condition this fuze may be found with a rubber waterproof cover over the top of the throat, with only the drilled plate extending out of it.

Operation: When the flare is loaded aboard the plane, the safety pin is removed. The fuze is then armed. Upon release the ball cage is jerked out of the fuze and releases the spring-loaded striker by allowing the retaining balls to fall outward. The striker is forced into the primer, which ignites the delay train in the delay capsule. The magazine is fired upon the expiration of the delay.

Remarks: The Fuze No. 42 Mk IV has a cap on the delay pellet. The delay is variable, depending upon the delay capsule used. A variety of capsules with delays ranging from 4.0 sec. to 32.5 sec. is available, and should be chosen according to the desired height of burst above the ground. The proper capsule for a certain height of burst can be chosen from tables prepared for this purpose.

Tail Fuze No. 844 Mk I (Obsolescent)

Data

Bombs used in ....Smoke Float No. 2 Mk I
Action .....Instantaneous on impact
Armed condition .....When safety pillar, swivel block, safety rod, and pull-off spring are removed
Fuzes used with .....None
Body diameter .....1.5 in.
Over-all length .....3.0 in.

Description: The fuze consists of a cylindrical, flanged body, which is externally threaded to permit the fuze to be screwed into the after end of a smoke float. A seating washer beneath the flange ensures a watertight joint between the fuze and the smoke float.

A cover fits over the body and is held in position by a U-shaped securing wire which passes through an annular groove in the body and two holes in the cover. The wire does not prevent rotation of the cover, which can be turned for the purpose of adjustment. A base plug is screwed into the body and supports a detonator holder, which is in turn screwed into it. The detonator holder houses a detonator and a gunpowder pellet.

One end of the striker is screwed into a striker head. A creep spring, which engages the striker head and the base plug, holds the striker clear of the detonator. A hole extending through the striker head is aligned with two holes in opposite sides of the cover. A safety pillar is screwed into one of the holes in the cover and projects into one end of the hole in the striker head. A safety rod passes through the other hole in the cover and extends into the opposite end of the hole in the striker head. The safety rod is retained in position by a pull-off spring, which is locked between a fork-ended swivel block and a shoulder on the safety rod. A pin passing through the forked end of the swivel block provides an anchorage for a fuze-setting control link.

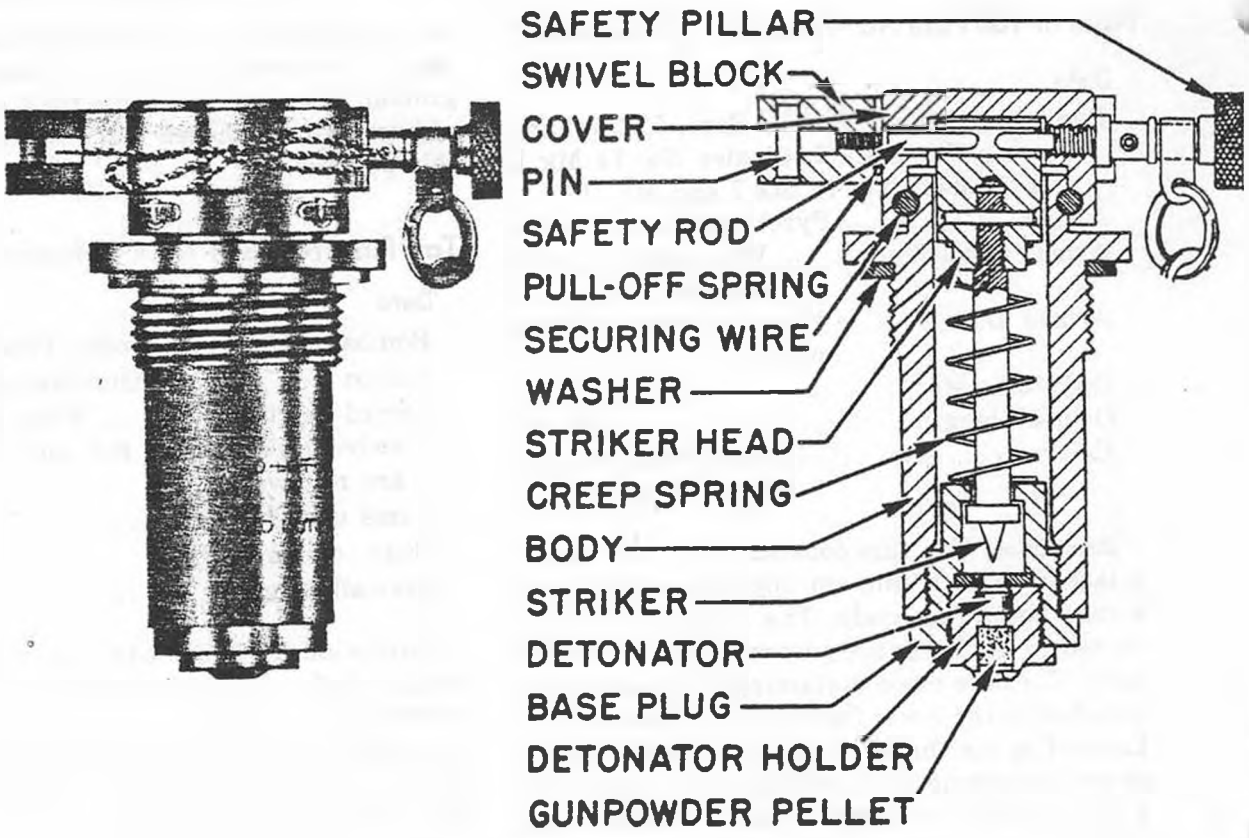

Figure 155—Tail Fuze No. 844 Mk I

A whipcord becket, extending around the fuze, passes through the forked end of the swivel block and a hole in the safety pillar.

Operation: The fuze is screwed into the tail end of a smoke float, and the fuzed smoke float is loaded into the carrier. The swivel block is connected to the fuzing unit by a fuze-setting control link. Just before the airplane takes off, the safety pillar is removed.

When the smoke float is released from the carrier, the swivel rod, safety block, and pull-off spring remain attached to the carrier by the fuze-setting control link, so that the striker is held away from the detonator only by the creep spring while the smoke float is falling.

On ground or water impact, the striker moves down, overcoming the creep spring, to pierce the detonator. The detonator fires the gunpowder pellet, and the flash from the gunpowder pellet fires the igniter of the smoke float.

Nose Fuze No. 845 Mks I-IV (Obsolete)

Data

Bombs used in .....G.P. 250-lb. Mks III and IV, G.P. 500-lb. Mks III and IV, G.P. 1,000-lb. Mk I, and G.P. 1,900-lb. Mk I. Will fit bombs which take any standard nose pistol.
Action .....Fires upon disturbance
Armed condition .....When the vanes are up or are broken off after impact
Fuzes used with .....No. 37 Mks I-VI
Arming time .....20 seconds after impact
Vane span .....4.5 in.
Body diameter .....2.25 in.
Over-all length .....3.5 in.
Color .....Unpainted steel

Description: The fuze consists of a body, arming vanes, and an electric circuit comprising a dry cell, an igniter bridge, a sensitive mercury switch, and a delay arming switch. The upp part of the fuze body is ogival to complete the

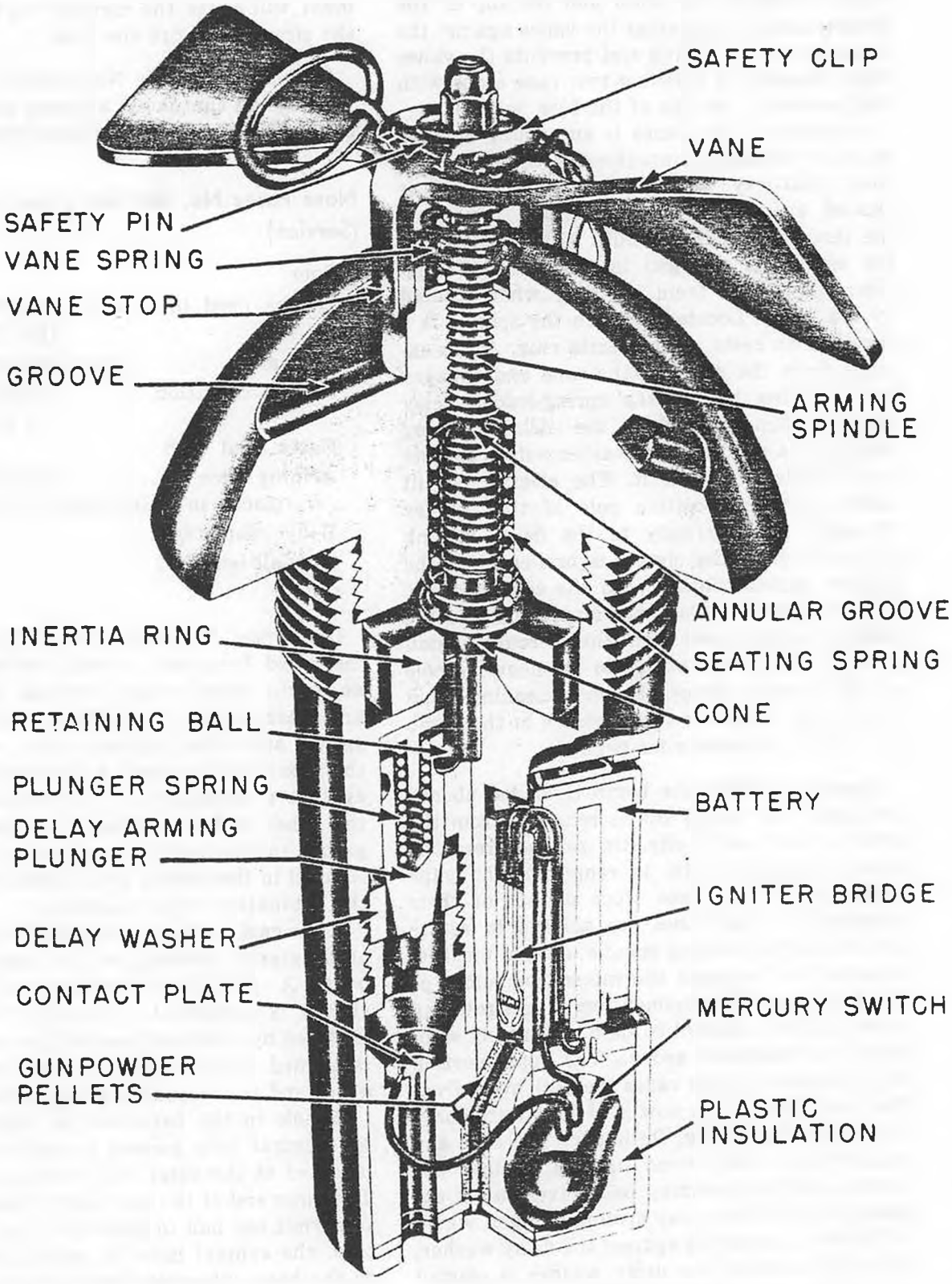

Figure 156—Nose Fuze No. 845

streamlining of the bomb. A safety clip, inserted between the vanes and the top of the arming spindle, depresses the vanes against the force of the van spring and prevents the vanes from rotating by meshing two vane stops with two grooves in the top of the fuze ogive.

Attached to the vanes is an arming spindle, which is threaded down through the top of the fuze. Half-way down the arming spindle is located an annular groove, which interrupts the threading of the spindle. The lower end of the spindle is enlarged to prevent its falling completely away from the fuze when rotated by the vanes. Located beneath the spindle is a cone, which rests in an inertia ring. A pin extends from the point of the cone and engages the retaining ball of the spring-loaded delay arming plunger. Below the delay arming plunger is a plastic delay washer with a contact plate located beneath it. The electric circuit leads from the positive pole of the battery through the fuze body to the delay arming plunger, where the circuit is broken until the plunger makes contact with the contact plate. From the contact plate, the circuit leads to the mercury switch, and from the mercury switch through the igniter bridge to the negative pole of the 1.5-volt dry-cell battery. Leading from the igniter bridge to the exploder in the bomb is a series of gunpowder pellets.

Operation: When the bomb is loaded aboard the plane, the safety pin is removed from the arms of the safety clip. On release from the plane, the safety clip is removed. The vane spring forces the vane stops up out of their grooves, and the vanes are allowed to rotate and thread the arming spindle upward until its enlarged end engages the internal shoulder of the fuze body. The momentum of the rotating vanes is then sufficient to snap the arming spindle at the weakened groove. The upper portion of the spindle and the vanes then fall away from the fuze. The cone is now held downwards only by the seating spring. On impact, the cone and attached pin are forced upward against the spring, and the retaining ball moves out of engagement with the delay arming plunger, which is forced by its spring against the delay washer. After 20 seconds, the delay washer is pierced and the plunger makes contact with the contact plate, thus completing the firing circuit except for the mercury switch. Any subsequent movement will cause the mercury to flow, complete the circuit, and fire the fuze.

Remarks: The Fuze No. 845 Mk II is like the Mk I except that it has a spring-link type safety clip, and the nose of the fuze is shorter.

Nose Fuzes No. 846 Mk I and No. 879 Mk I (Service)

Data

Bombs used in .....I.B. 30-lb. Mks II, IIM, III, and IIIM
Action .....Instantaneous on impact
Armed condition .....When safety pin is removed
Fuzes used with .....None
Arming time .....Armed when bomb is placed in Small Bomb Container
Body diameter .....1.75 in.
Over-all length .....2.75 in.
Color .....Brass

Description: The Fuze No. 846 consists of a machined fuze body, bored centrally to house an inertia pellet, which contains the detonator and flash channel, a safety ferrule, a creep spring, and a fixed striker, which is riveted into the fuze body. One end of the creep spring rests against a shoulder on the inertia pellet, and the other end is located in a circumferential groove in the bore of the fuze body. The flash channel in the inertia pellet leads directly from the detonator to the magazine.

A magazine ring is threaded and cemented onto external threads on the base of the fuze body. A magazine containing a gunpowder charge is crimped to the ring. The magazine is closed by a cupped washer, the hole of which is aligned with the flash channel in the inertia pellet and is covered by a paper disc.

A hole in the fuze body at right angles to the central bore houses a retaining ball, and is closed at the outer end with a screwed plug. The inner end of the hole is of reduced diameter to permit the ball to protrude into, but not fall into, the central bore. A second hole, parallel to the bore, intersects the transverse hole and houses a transit safety pin, which retains the ball in such a position that it projects into the

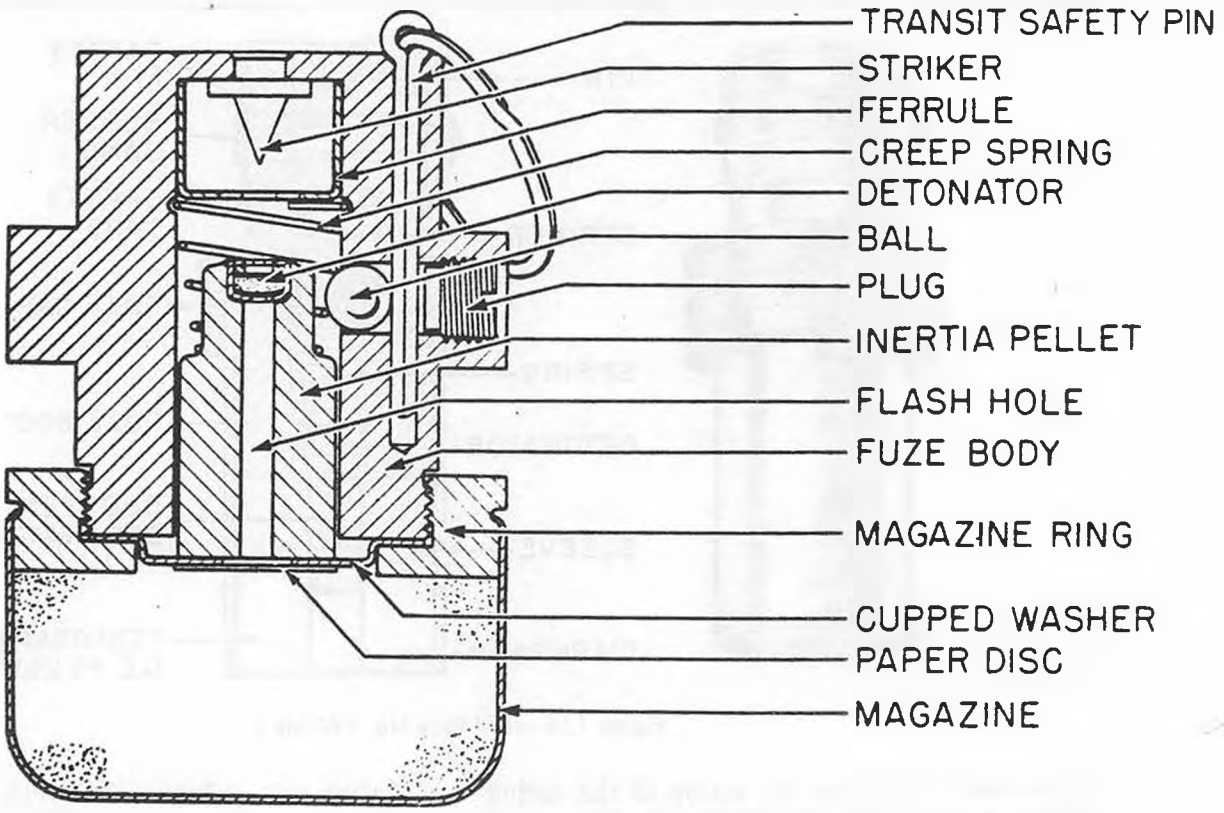

Figure 157—Nose Fuze No. 846 Mk I

bore and prevents the inertia pellet from accidental contact with the striker. The safety pin has a ring passing through its head to facilitate its withdrawal from the fuze.

The fuze has no external threads for fixing into the bomb, but is held in place in the fuze pocket by the threaded nose plug. Two recesses are bored in the boss of the fuze to engage two projections on the base of the nose plug. This locking arrangement ensures that the safety-pin hole in the nose plug is properly positioned over the safety pin and safety-pin hole in the boss of the fuze.

Operation: The transit safety pin in the fuze is removed and replaced by a longer safety pin, when the fuze is assembled in the bomb. This long safety pin is removed manually when the bomb is placed in the Small Bomb Container before loading into the plane. The fuze is then armed. On impact with the target, the inertia pellet overcomes the resistance of the creep spring, bends the tabs on the safety ferrule, and impinges against the striker, to fire the detonator. The flash from the detonator passes through the flash hole in the inertia pellet, and fires the gunpowder magazine, which initiates the bomb.

Remarks: Normally these fuzes are shipped in place in the bombs, thus requiring the long shipping safety pin.

The Fuze No. 879 Mk I is identical to the No. 846 Mk I except that it has five grams of aluminum powder in the burster well.

Tail Fuze No. 847 Mk I (Service)

Data

Bombs used in .....A./T., 9 lb. Mk I
Action ..... Instantaneous on impact
Armed condition ...When safety tape and safety pin are removed
Fuzes used with .....None
Body diameter .....1.25 in.
Over-all length .....2.875 in.

Description: The fuze body houses a striker, a spring, and a 10-grain percussion detonator.

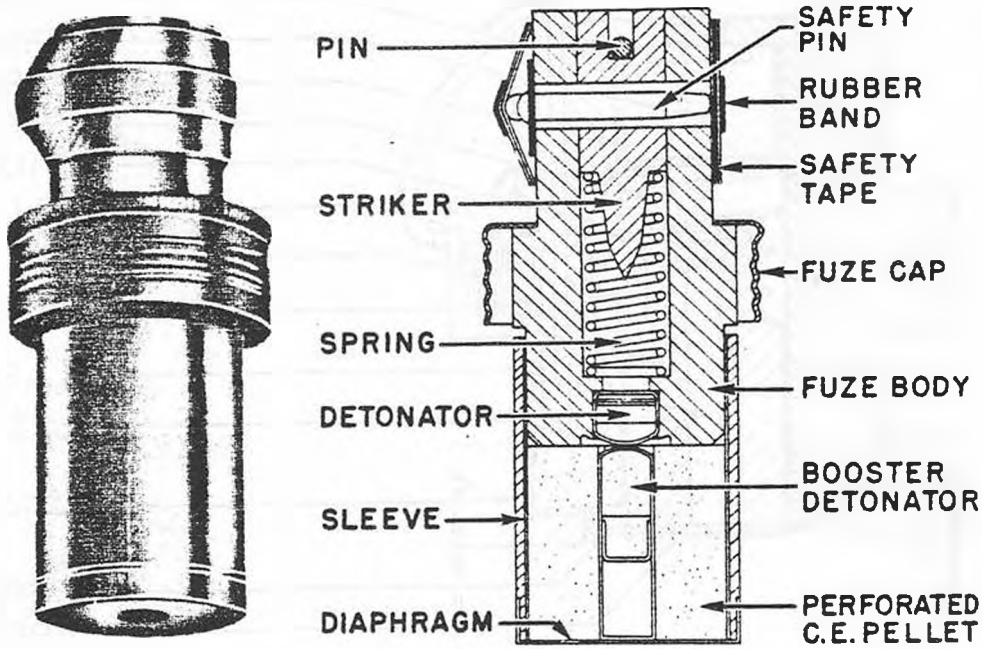

Figure 158—Tail Fuze No. 847 Mk I

The striker is held by the action of the spring against a pin riveted in the fuze body. A slot is provided in the striker for this pin.

A safety pin passes through the striker and the fuze body. It is attached to a safety tape, which is wound around the fuze body and held in position by a rubber band. Secured to the fuze body is a sleeve, closed by a diaphragm. This sleeve houses a perforated No. 6 C.E. pellet. A booster detonator is housed in the C.E. pellet. Fixed to the fuze body is a screw-threaded fuze cap, to be screwed onto the locator in the bomb when the latter is fuzed.

Functioning: When the fuzed bomb is dropped from an airplane, the safety tape, which is loosened during the fuzing of the bomb, unwinds and withdraws the safety pin from the fuze. On impact of the bomb with the target, the striker overcomes the resistance of the spring and fires the detonator. The percussion detonator fires the booster detonator, which, in turn, fires the C.E. pellet, and detonates the bomb.

Nose Fuze No. 848 Mks I-V (Service)

Data

Bombs used in .....4.5-in. flare, 5.5-in. flare, 7.0-in. hooded flare, 4.5-in. photoflash bomb, Cluster No. 1 Mk I, Cluster No. 2 Mk I, and 250-lb. T.I. bombs

Action .....Pyrotechnic delay aerial burst

Armed condition .....When the vane cap and safety pin are removed. (Still requires 10 vane revolutions to function.)

Arming time .....On release

Body diameter .....3.0 in.

Over-all length .....5.25 in.

Color .....Aluminum vanes and vane assembly, black vane cap, brass throat and upper fuze body, and aluminum lower body and base piece

Description: The Fuze No. 848 Mk V consists of a vane assembly, throat and upper fuze body, and lower fuze body and base piece. There are ten small vanes of sheet steel attached to the vane hub, to which is also attached the arming spindle. A ring soldered to three clips is located around the vanes to prevent damage to the vanes and to hold the vane cap on. The spindle threads down into the throat and holds down a brass retaining cap or ball-release cap. The retaining cap holds two retaining balls in grooves in the upper part of the striker, which is spring-loaded down. A safety pin passes through the throat and the striker. In the lower part of the throat is the primer, which flashes down to a delay train housed in the lower fuze

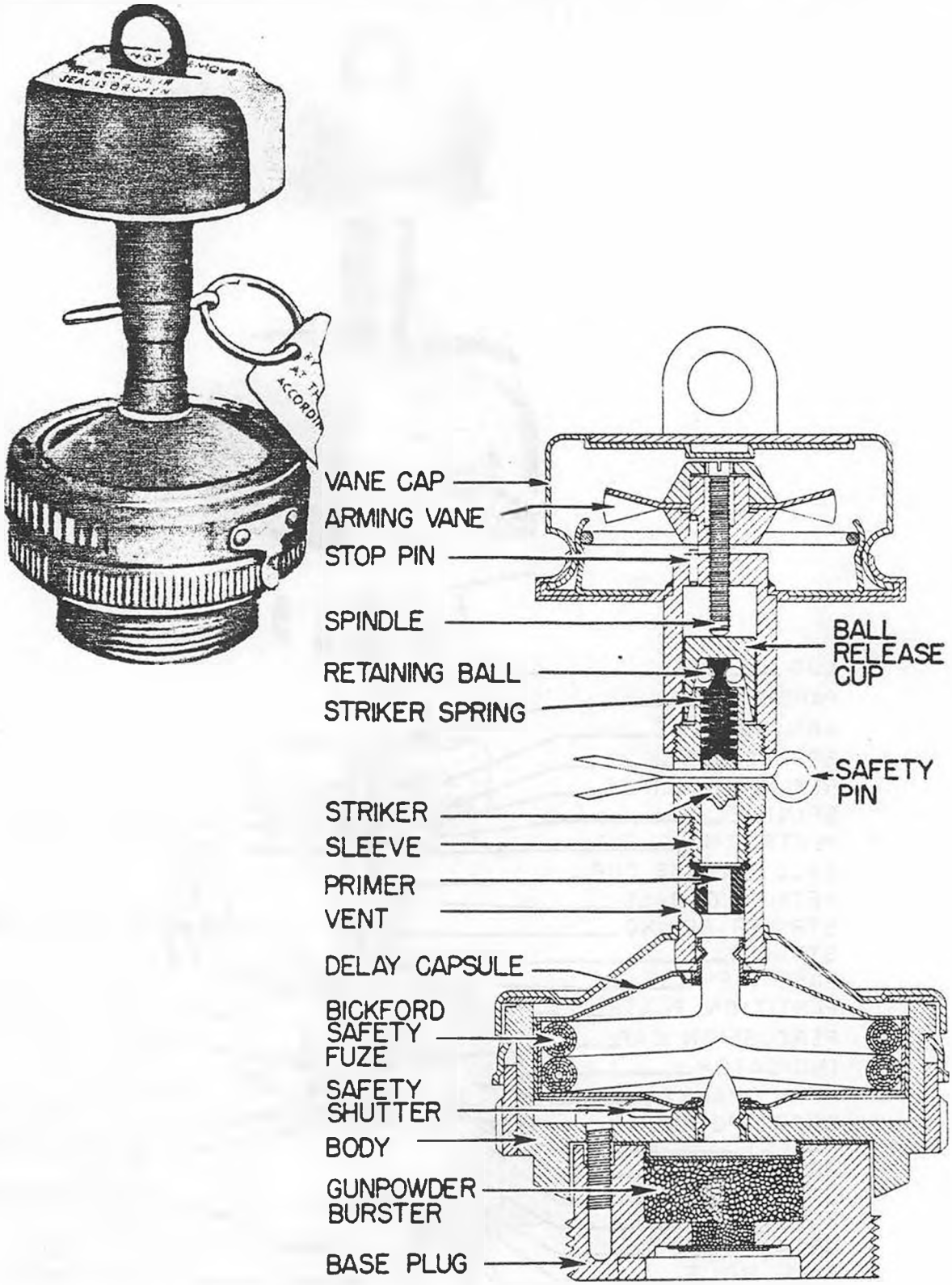

Figure 159—Nose Fuze No. 848 Mk V

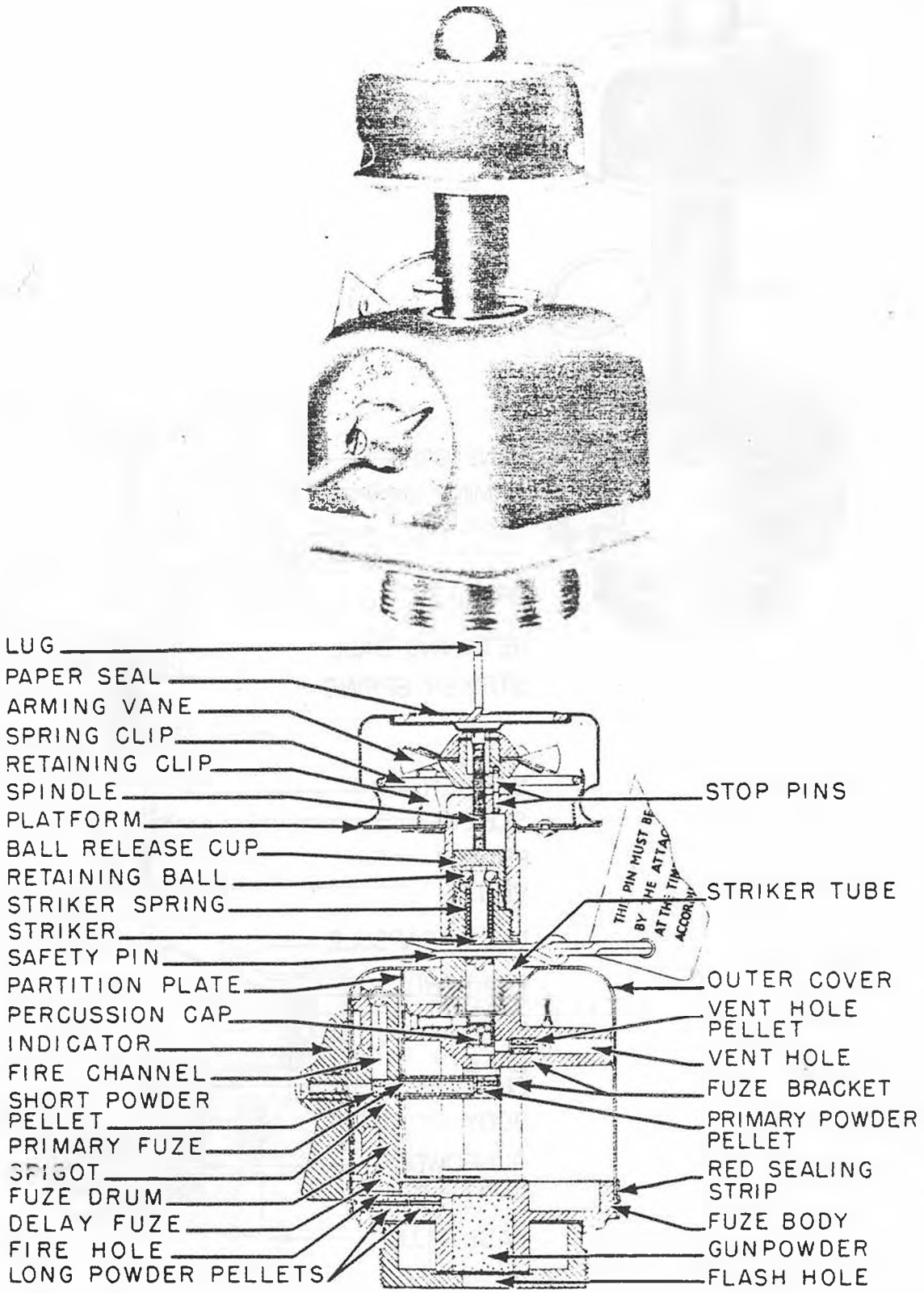

Figure 160—Nose Fuze No. 849 Mk II

body. The base plug, which houses the magazine, is attached to the lower fuze body.

Operation: When the bomb or flare is put in the plane, the safety pin is removed from the fuze. Upon release, the vane cap is pulled off and the vanes are free to rotate and thread the spindle out of the throat. When the spindle has moved out, the retaining cap falls forward under pressure from the retaining balls, releasing the two retaining balls, and allowing the striker to hit the primer. The primer fires the delay train, which burns out and flashes down to the magazine, firing the fuze.

Remarks: The delays, housed in capsules, vary from 4.0 to 32.5 seconds, depending on the capsule used.

The Fuze No. 848 Mk IV differs from the Mk V in that instead of the arming spindle holding down the ball retaining cap, it has an arming cone which moves down inside a ball cage and holds the retaining ball out, preventing the ball cage and spring-loaded striker from moving down.

Nose Fuze No. 849 Mks II and III (Service)

Data

Bombs used in ....4.5-in. flare and Cluster No. 1 Mk I
Action .....Pyrotechnic delay aerial burst
Armed condition .....When vane cap and safety pin are removed
Arming time .....When dropped
Body diameter .....3.0 in.
Over-all length .....6.0 in.
Color .....Black with a red sealing strip joining the outer cover and body

Description: The vane and vane assembly of the Fuze No. 849 Mk II consist of a vane cap, which is held by three retaining clips, the vanes, and the arming spindle. A steel ring is soldered to the retaining clips to prevent damage to the vanes, which are of sheet steel and are staked to the arming spindle. The spindle threads into the arming-vane support and down onto the ball-retaining cap, which holds four retaining balls in the groove in the top of the spring-loaded striker. A safety pin passes through the arming-vane support and the striker. Below the striker is a percussion cap which flashes down to the primary powder pellet. At right angles to the flash channel below the cap, is a vent hole and vent hole pellet. This vent hole leads to the outside, but is sealed by the outer cover in the unfired condition. At the outer end of the primary pellet chamber is a short powder pellet, which flashes through a flash channel in the fuze drum to the length of Bickford-type safety fuse contained in a lead foil sheath surrounding the fuze drum. A short fire hole leads from the safety fuse to the long powder pellets which lead to the magazine. The magazine is housed in the lower fuze body. On the outer side of the fuze is a scale graduated from 0 to 95 seconds, with an indicator which moves around it to set the fuze. A red sealing strip joins the outer cover and fuze body.

Operation: When the flare is put in the plane, the indicator on the side of the fuze is set at the desired delay. When released, the safety pin and vane cap are removed. As the flare falls, the vanes rotate and raise the arming spindle, allowing the ball-retaining cap to be moved away by the pressure of the balls holding up the spring-loaded striker. The striker is then freed and hits the percussion cap, which flashes down and fires both the vent-hole pellet and the primary powder pellet. The products of combustion break the seal of the vent hole in the outer body. The flash passes to the short powder pellet, and through the flash channel to the delay fuse. This burns in a clockwise direction, and flashes through the fire hole into the lower fuze body and then along the long powder pellets to fire the magazine.

Remarks: The No. 849 Mk III time-setting disc is calibrated from 0 to 70 seconds and includes a safe setting.

Tail Fuze No. 850 Mks I and II (Service)

Data

Bombs used in.....B. 250-lb. Mks III and IV
Armed condition .....When safety pin is removed and the bomb is found in water
Fuzes used with .....None
Action.Hydrostatic arming and contact firing
Body diameter .....2.5 in.
Over-all length.....14.25 in. (with gaine assembled)

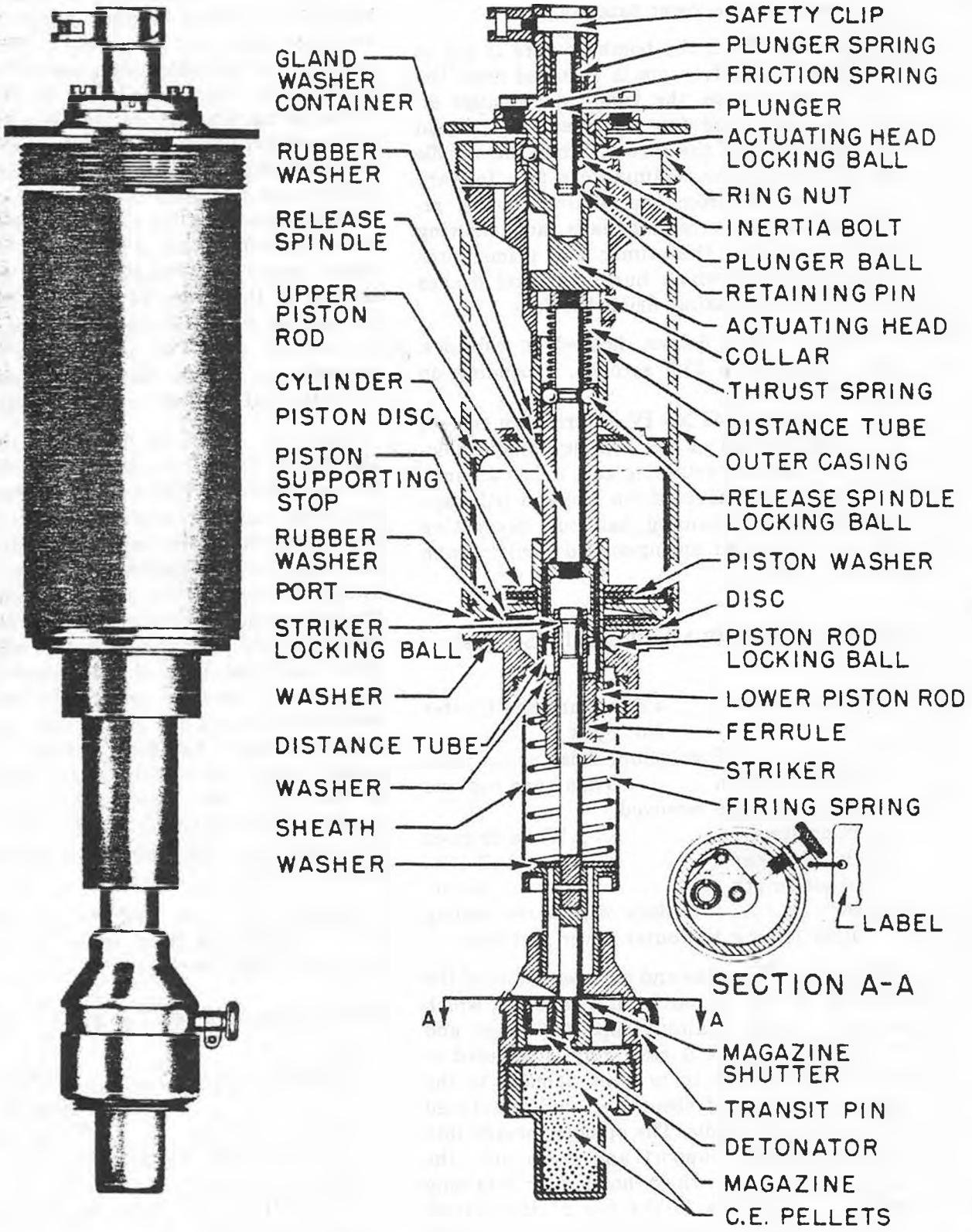

Figure 161—Tail Fuze No. 850 Mk I

Color .....Fuze body of unpainted steel with a brass colored gaine

Description: The Bomb Fuze No. 850 Mk I is a hydrostatic-arming, contact-firing bomb fuze specially designed for use in the 250-lb. Buoyancy bombs. The fuze itself consists of two portions, the upper portion housing the hydrostatic mechanism, and the lower portion forming the magazine.

The upper portion of the outer casing houses the actuating head. The head is locked to the casing by a ball lock, which is freed on impact with water. The cylinder is of slightly smaller diameter than the outer casing, leaving a small annular space between the cylinder wall and the casing. The lower end of the cylinder is in the form of a disc and is contained in the lower end of the outer casing to which it is soldered. A piston-supporting stop, consisting of a metal disc with protrusions on both faces, clamps a rubber washer in position and also supports the cylinder wall and the piston. The upper protrusion of the piston-supporting stop is provided with ports, which, together with ports formed in the lower end of the cylinder wall, connect the space below the piston with that between the cylinder wall and the outer casing.

The piston consists of a metal disc with a central hole into which the lower portion of the piston rod is inserted. This portion of the piston rod has a shoulder at its upper end by which the piston rod is raised when the piston is forced up the cylinder by hydrostatic pressure. The piston rod, which is hollow, is made in two sections. The upper section of the rod houses the release spindle, to which it is locked by a ball. The lower portion of the piston rod is threaded internally to accommodate a screwed ferrule, which houses the upper end of the striker. The upper end of the striker is locked to the ferrule by a ball lock. The ferrule is bevelled at its lower end, and forms part of a lock that prevents the return of the piston after the fuze has been armed. The lock consists of a locking ball, housed in a conical recess formed in the lower portion of the outer casing. A washer and a distance tube are inserted in the lower portion of the piston rod to support the upper section of the piston rod.

The striker is locked to the screwed ferrule in the lower section of the piston rod by a ball lock, and protrudes through the lower end of the ferrule. The lower end of the striker is housed in a blind hole in the spring-loaded shutter of the magazine, when the fuze is in the safe position. The firing spring, encased in a sheath, is interposed between the lower end of the outer casing and a washer supported by the striker shoulder.

A collar is screwed to the top of the release spindle and forms a bearing surface for the lower end of the actuating head. The thrust spring is interposed between this collar and the upper portion of the piston rod. The actuating head is contained in the upper portion of the outer casing, to which it is locked by a ball lock. The actuating head is bored axially to house a hollow inertia bolt, which accommodates a spring-loaded plunger. This plunger is retained in position by the fuze safety clip, which passes through the inertia bolt and the actuating head. A retaining pin prevents ejection of the plunger by its spring when the safety clip is withdrawn.

A light friction spring is fitted to the actuating head and bears on the inertia bolt. This spring engages in a groove in the inertia bolt when the bolt moves downwards.

The magazine, containing two C.E. pellets, is attached to the lower end of the sheath surrounding the firing spring, and is arranged so that the fuze can accommodate itself to any tolerance in the length of the central tube and exploder column in the bomb. A spring loaded shutter, which carries a detonator, is incorporated in the magazine. The shutter is held in the safe position by the striker and by a transit pin during storage and transit.

The fuze is retained in position in the bomb by a ring nut situated between the flange on the actuating head and the upper portion of the outer casing. A rubber washer around the lower portion of the outer casing forms a watertight seating, when the fuze is assembled in the fuze pocket of the bomb.

Operation

Bomb Dropped Live—On release from the plane, the safety clip on the fuze is removed by the fuze-setting control link, allowing the plunger to move up under the action of its spring. The plunger ball in the bore of the

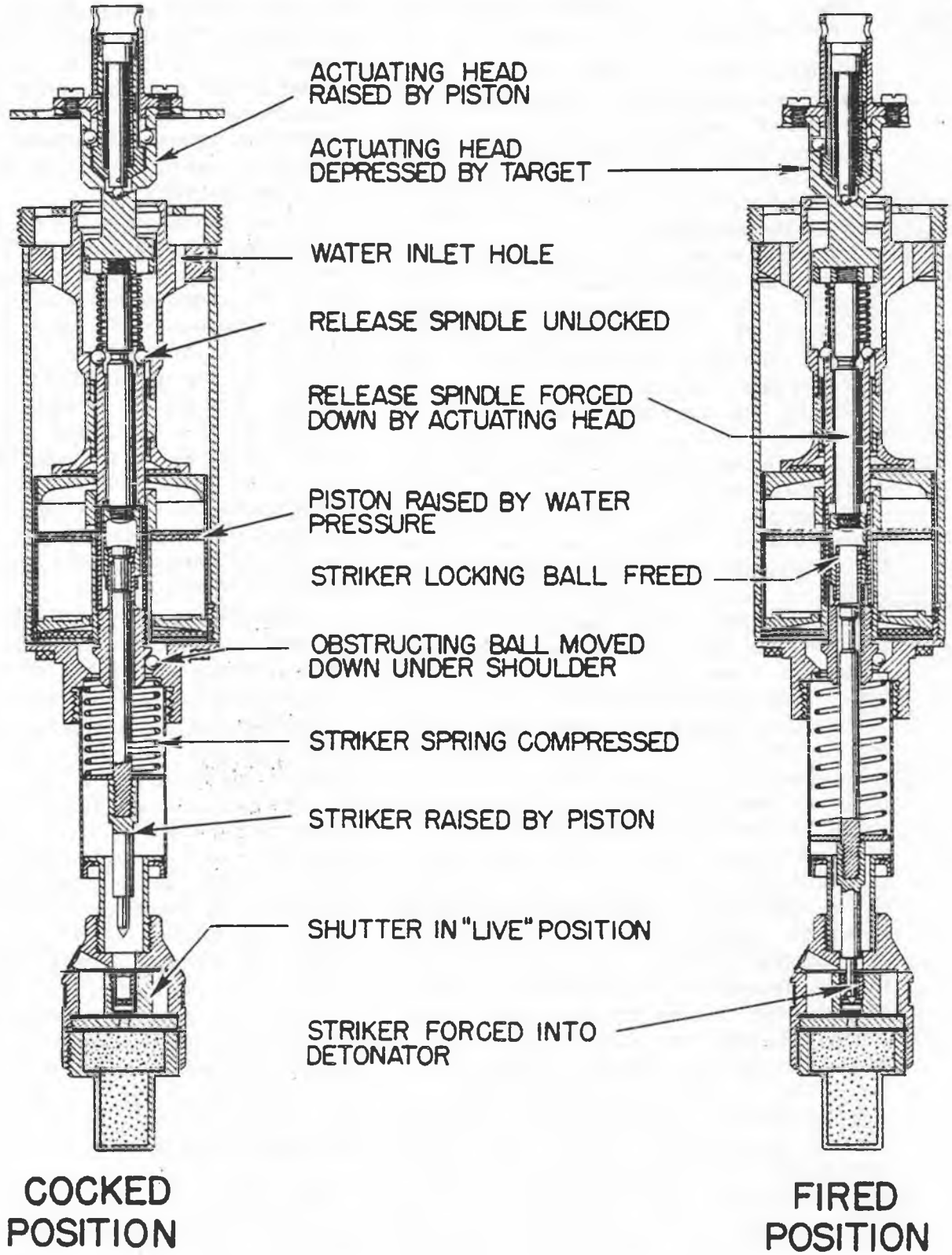

Figure 162—Tail Fuze No. 850 Mk I

actuating head is then free to move into the recess in the bottom of the bore.

On impact of the bomb with the water, the nose attachment and tail break away. The inertia weight in the fuze moves downward, because of the retardation of the bomb in the water, thus releasing the ball lock securing the actuating head to the upper portion of the outer case.

When the bomb is submerged, water enters the outer casing of the fuze through the holes in the upper portion of the outer casing, and flows through the annular space between the outer casing and the cylinder wall. It then enters the cylinder through the ports in the cylinder wall and exerts pressure on the lower face of the piston. The piston is thereby raised in the cylinder, taking the piston rod assembly with it. The striker, being locked to the release spindle, moves upward with the piston, and the washer on the shoulder of the striker compresses the firing spring. The raising of the striker also frees the spring-loaded shutter in the magazine, which moves over to align the detonator with the striker.

The motion of the piston also raises the release spindle and the actuating head, which, being attached to the contact disc of the bomb, raises the contact disc to the limit of its securing chains. The raising of the piston rod frees the ball lock securing it to the release spindle. The ball in the lower portion of the outer casing moves under the bevelled shoulder on the screwed ferrule, and so prevents return of the piston, once arming of the fuze has been achieved.

Having descended to its maximum depth, the bomb ascends contact disc uppermost, at a speed of 3½ ft./sec. under the influence of its buoyancy. Any possibility of the bomb's firing due to water drag on the contact disc is overcome by the thrust spring in the fuze. On impact with the target during its upward motion, the contact disc is forced down relative to the bomb, causing the actuating head to move down relative to the outer casing of the fuze. This, in turn, causes the release spindle to move down relative to the piston rod, thus freeing the ball lock by which the striker is locked to the release spindle. The striker is then forced into the detonator by its spring, and initiates the normal explosive train.

If the bomb fails to encounter any obstruction during its upward motion, it will rise to the surface and remain there for approximately ten minutes. After this time sufficient water will have entered through the two sinking holes in the buoyancy chamber to cause the bomb to sink to the bottom. If the contact disc is depressed during the time that the bomb is floating on the surface, the fuze will function and detonate the bomb.

Bomb Dropped Safe—Provision is made in the fuze for dropping the bomb safe. This is necessary to provide for jettisoning the bomb in the event of engine trouble during or shortly after the aircraft takes off from a carrier. Safe dropping is achieved by a ball, accommodated in the bore of the actuating head, which prevents the inertia bolt from moving sufficiently in a downward direction to release the actuating head ball lock.

On release from the plane, the safety clip remains in position on the fuze. On impact with the water, the break-up and removal of the tail may cause the safety clip of the fuze to be withdrawn accidentally. The retardation of the bomb in the water causes the plunger to move downward against the action of its spring, preventing escape of the ball into the recess in the bore of the actuating head. The inertia bolt also moves downward, but it is obstructed by the ball and cannot move sufficiently to release the ball lock securing the actuating head to the upper portion of the outer casing of the fuze. The friction spring in the actuating head falls into the groove in the inertia bolt, thus preventing the actuating head from being lifted by wave motions after the bomb has been dropped safe, and ensuring that the bomb remains in the safe condition.

Remarks: The Fuze No. 850 Mk II differs from the Mk I in that the safety clip is replaced by a cotter pin, which pierces both the plunger and the actuating head.

Nose Fuze No. 855 Mk I (Service)

Data

Bombs used in.....S.C. 400-lb. Mk I/A "Flying Cow"

Action .....Aerial burst

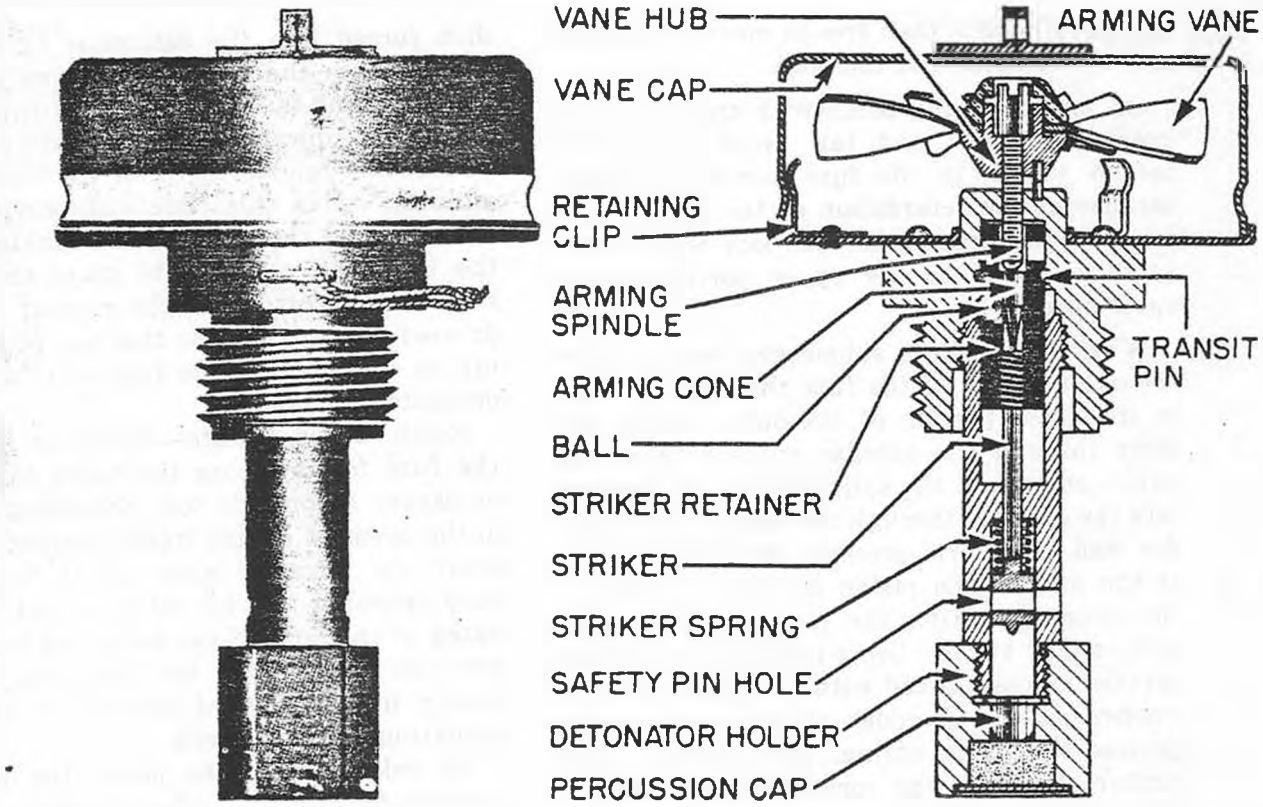

Figure 163—Nose Fuze No. 855 Mk I

Armed condition.....When the safety pin is removed and the safety cap is off
Fuzes used with.....None
Body diameter .....2.75 in.
Over-all length .....4.5 in.
Color....Brass upper body, steel lower body, and black vane cap

Description: The fuze has a black vane cap on which is stamped the number and mark of the fuze. This cap is held on by three retaining clips, which are riveted to the shoulder of the upper fuze body. The steel vanes are attached to the vane hub connecting to the top of the arming spindle. The arming spindle holds down a black plastic arming cone, which rests in a striker retainer and holds out three retaining balls. The striker retainer is screwed to the upper end of a spring-loaded striker. A safety-pin hole passes through the body and also the striker. The striker retainer is grooved in order to accommodate a transit pin. A detonator holder, which carries the percussion cap, is screwed to the bottom of the body.

Operation: The transit pin is removed when the bomb is put in the plane. On release, the safety cap is pulled and the vanes are then free to rotate, threading the arming spindle up and out of the arming cone. The vanes and arming spindle rotate out and fall away. When the arming spindle has threaded up, the three retaining balls are cammed in by a shoulder on the fuze body, and move the arming cone up. This allows the striker retainer to move down with the blunt spring-loaded striker, and hit the percussion cap to set off the fuze.

Tail Fuzes No. 859 Mk I and No. 854 Mk I (Service)

Data

Bombs used in....No. 859, 4-lb. smoke bomb; No. 854, 100-lb. smoke bomb
Action.....All-ways action on impact
Armed condition.....When plastic cap and safety pin are remove
Fuzes used with.....None
Body diameter ..... 1.8 in.

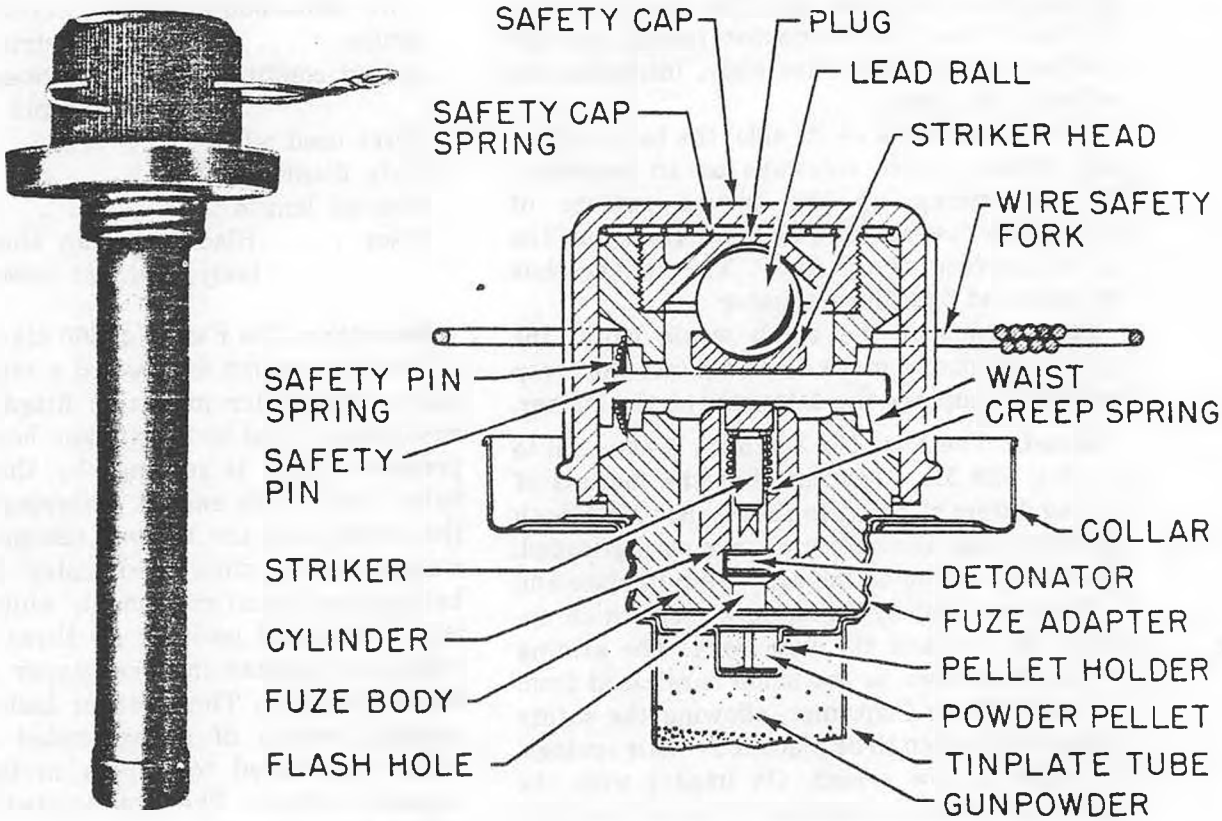

Figure 164—Tail Fuze No. 854 Mk I

Over-all length ..... 2.0 in.
Color....Black plastic cap and fuze body, and a tin magazine tube in Fuze No. 854

Description: The Fuze No. 859, which is of the all-ways action type, has a bakelite body, waisted to form two chamfered flanges. It is threaded at its lower end to permit it to be screwed into the fuze adapter. The fuze body houses a hollow cylinder, at the lower end of which a detonator is located over a flash hole in the body of the fuze. The firing pin is positioned in the cylinder, and is split at its lower end to form a double striker. The striker is held away from the detonator by a light creep spring, which also is housed in the hollow cylinder.

The upper end of the striker terminates in an enlarged head having a seating for a lead ball. The ball is held in position by the concave under-surface of a bakelite closure disc which is screwed into the top of the fuze body. Just below the striker head, the stem of the striker is drilled to receive a safety pin, which extends through the fuze body and has an enlarged head housed in the waist of the body. A short length of webbing tape, which is wound around the waist of the fuze body, is secured to the head of the safety pin. A lead sleeve, curved to fit into the waist of the fuze body, is secured over the free end of the webbing tape.

A bakelite safety cap is fitted over the fuze body, and has a fabric drogue attached to it by adhesive tape.

Operation: When the bomb is released from the Small Bomb Container, the safety cap of the fuze is drawn off by the action of air resistance on the fabric drogue. The lead sleeve on the webbing tape attached to the safety pin causes the free end of the tape to clear the waisted portion of the fuze body and to be caught in the air stream, thus withdrawing the safety pin. The fuze is now armed, with the lead ball and the striker held away from the detonator only by the creep spring.

On impact with the target, the momentum of the lead ball and the striker overcomes the resistance of the creep spring and cause the

striker point to pierce and fire the detonator. The flash from the detonator passes through the flash hole in the fuze body, initiating the action of the bomb.

If the bomb falls on its side, the ball, striker, and cylinder move sideways as an assembly, the ball riding up the curved surface of the closure disc and the cylinder riding up the curved surface of the body. The striker thus operates and fires the detonator.

Tail impact of the bomb would cause the hollow cylinder to move down against the creep spring and impinge the detonator on the striker.

Remarks: The Fuze No. 854 Mk I is identical to the No. 859 Mk I, except that the method of arming differs slightly. In the No. 854 Mk I, both the safety cap and safety pin are spring-loaded. The safety cap holds the safety pin in place and is itself retained by an arming fork which engages the cap and the fuze body. The arming fork is withdrawn as the bomb is released from the Small Bomb Container, allowing the safety cap and safety pin to be ejected by their springs. The fuze is now armed. On impact with the target, its action is identical to that of the Fuze No. 859 Mk I.

The Fuze No. 854 Mk I has a long tubular burster screwed and cemented to its lower portion. This burster tube contains a powder pellet and about 2 oz. of gunpowder. It is approximately 5½ in. long, and the tubular portion is 0.9 in. in diameter.

Nose Fuzes No. 860 Mks I and II, and No. 896 Mk I. Tail Fuzes No. 867 Mk I, No. 885 Mk I, and No. 886 Mk I (Service)

Data

Bombs used in

No. 860—4.5-in. Reconnaissance Flare Mks I-VII, 5.5-in. Reconnaissance Flare Mks I and II, 4.5-in. Photoflash, Cluster No. 1 Mk I, Cluster No. 2 Mk I, Cluster No. 3 Mk I, and T.I. 250-lb. bombs

No. 896—T.I. 1,000-lb. bombs

No. 867—Cluster No. 4 Mk I, T.I. 250-lb. bombs, and T.I. 1,000-lb. bombs

No. 885—Cluster No. 4 Mk I, Cluster No. 6 Mks I and II, Cluster No. 17 Mks II and III, Cluster No. 23 Mk I, Cluster No. 24 Mk I, Cluster No. 7 Mk I, and 500-lb. Smoke Bomb Mk II

No. 886—500-lb. Smoke Bomb Mk II

Action.....Barometric aerial burst

Armed condition....Vane cover, vanes, and safety pin removed

Fuzes used with.....None

Body diameter .....2.75 in.

Over-all length .....6.5 in.

Color.....Black vane cap, aluminum upper body, and zinc lower body

Description: The Fuze No. 860 Mk II consists of a body into which is screwed a striker housing and a gunpowder magazine fitted with a percussion cap. Inside the striker housing a compressed striker is retained by three retaining balls. These balls engage a sloping shoulder on the striker and the tapered internal surface of a sleeve surrounding the housing. The sleeve is held against axial movement, while the striker is in the cocked position, by three larger balls, which are located in three upper holes in the striker housing. These larger balls engage the parallel portion of a cone-ended arming pin which is secured to a boss in the end of a vacuum bellows. The non-pointed end of the striker has a hole into which the pointed end of the arming pin can enter.

One end of the vacuum bellows and a stop plate form the closed end of a cylinder, which passes over the striker housing and abuts against a washer located in a cup. An arming spring is compressed between the cylinder and the fuze body. The vacuum bellows contain a spring, which regulates expansion or contraction of the bellows by atmospheric pressure.

When the fuze is unarmed, the cylinder is held down towards the magazine by an arming screw, which is screwed through an arming-vane support carried by a thin outer cover attached to the fuze body by screws.

The arming screw supports an arming vane which is so mounted that it is permitted half an inch of free travel before it locks against the head of the arming screw. Two stop pins, one projecting from the arming-vane support and the other from the arming-vane hub, prevent these two parts from binding together.

The arming vane is protected against damage, premature rotation, and freezing by an arming-vane cover bedded against the outer cover of the fuze. The arming-vane cover is fitted over

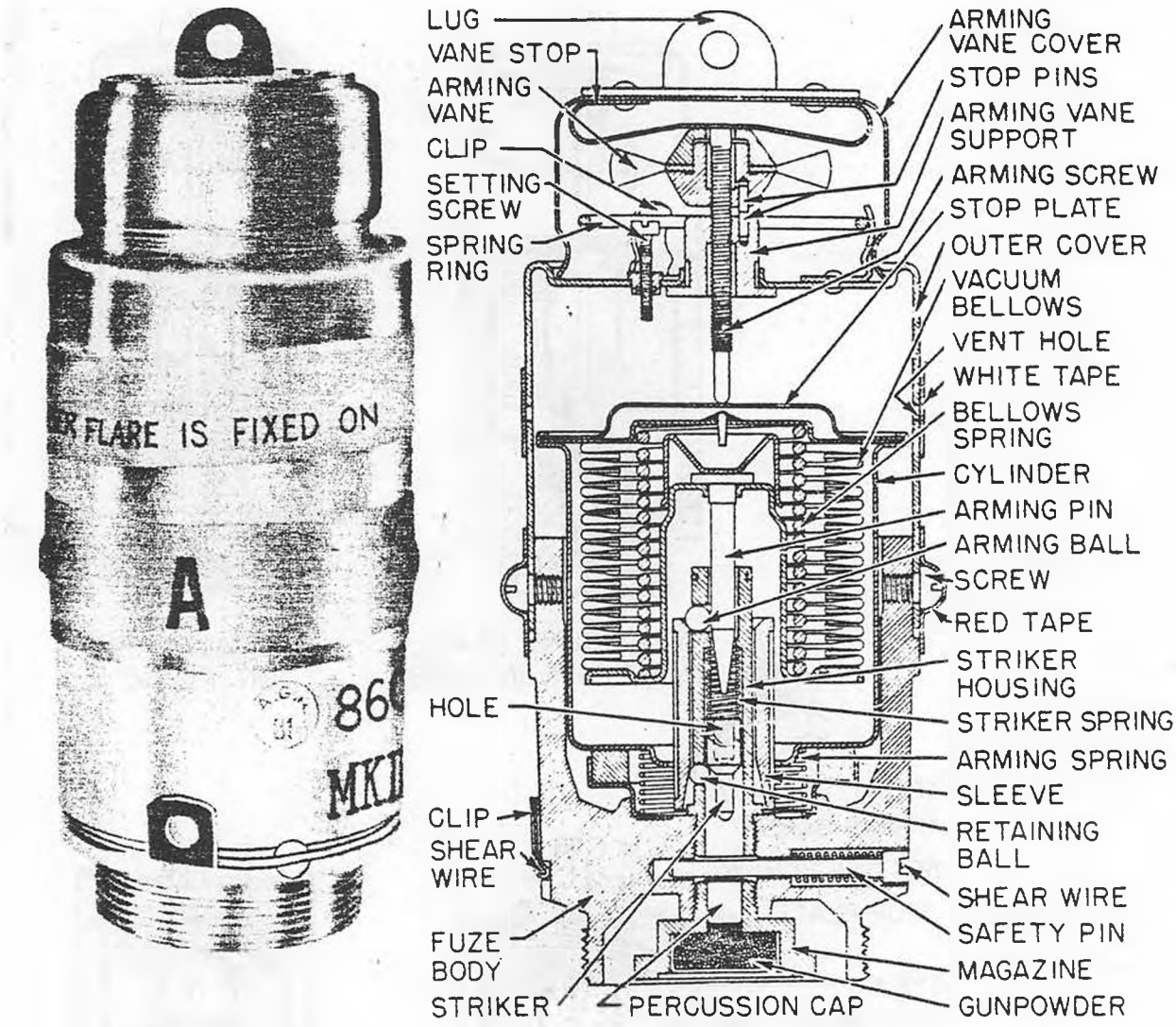

Figure 165—Nose Fuze No. 860 Mk II

three clips riveted to the outer cover. A vane stop, riveted to the inside of the arming-vane cover, prevents premature rotation of the arming vane due to vibration. A lug is provided on the arming vane cover for attachment to the fuze-setting control link of a bomb carrier.

Four vent holes in the outer cover permit air to escape from inside, thus relieving excess pressure built up inside the fuze while falling after the arming screw has fallen away. The vent holes are covered by adhesive tape on which is written: TO BE REMOVED AFTER FLARE IS FIXED ON CARRIER.

A safety pin is housed in the fuze body between the striker and percussion cap, so that, if the striker should be prematurely released, the safety pin will prevent its firing the cap. The safety pin is held in place by a shear wire in a groove around the fuze body and in a slot in the head of the pin. A spring, housed in the body, is compressed beneath the head of the safety pin. A clip is mounted on the shear wire and can slide along the wire.

Operation: When the fuzed weapon is dropped from the plane, the arming-vane cover is pulled clear and the arming vane exposed. The shear wire is broken and the spring ejects the safety pin. The arming vane then rotates freely until it becomes locked on the head of the arming

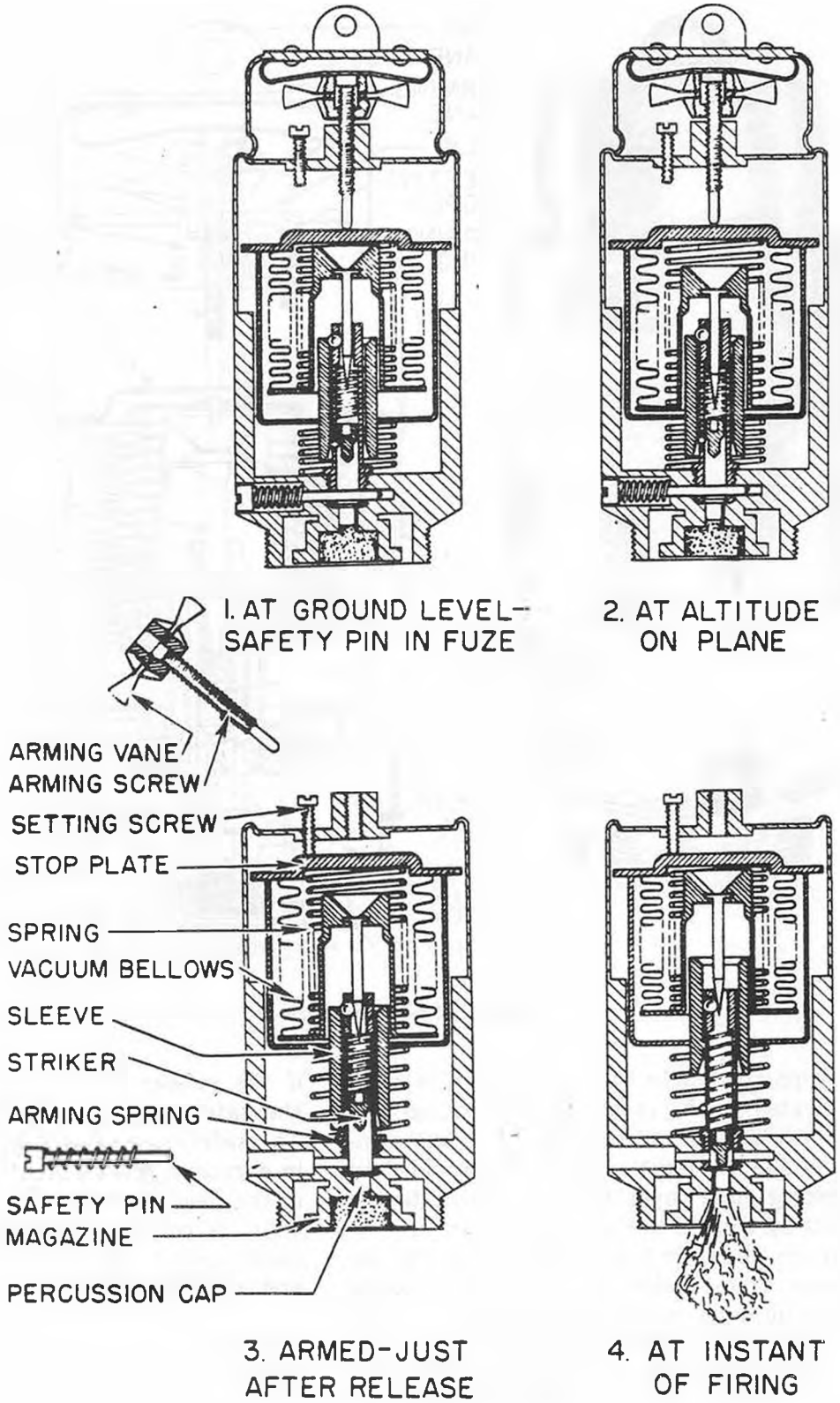

Figure 166—Operating sequence of Nose Fuze No. 860 Mk II

screw. The screw rotates with the vanes until they both fall away. The cylinder, together with the vacuum bellows, will then have been moved by the arming spring so that the stop plate rests against the inner end of the setting screw. This movement of the cylinder withdraws the arming pin so that the balls engaged by the pin rest against the cone-shaped end of the pin.

As the weapon continues to fall, atmospheric pressure increases, and the vacuum bellows contracts, thus compressing the spring in the bellows and withdrawing the arming pin. When the weapon reaches the predetermined barometric pressure, the arming pin will have moved up, and the balls pressed into the striker housing by the sleeve. This permits the sleeve to be cammed away from the magazine end of the fuze by the action of the striker spring, until the balls engaging the striker are freed and fall away. The striker is released and is forced by its spring against the percussion cap, which fires the gunpowder magazine.

Remarks: The Nose Fuze No. 860 Mk I differs from the Mk II in that the zinc-colored section of fuze is of greater diameter than the rest of the body.

The Nose Fuze No. 896 is the same as the No. 860 Mk II, but a delay element has been introduced between the cap and the magazine. The fuze is designated either A2, A3, or A4, the figure in each case indicating the length of delay in seconds.

The Fuze No. 867 Mk I has no arming vane but is instead fitted with a T-bar, which engages an arming fork on the standard British tail unit.

The Tail Fuze No. 885 Mk I is the same as the No. 867 Mk I, but has a 2-sec. delay.

The Tail Fuze No. 886 has a shear wire to prevent arming at low speeds, and a 1-sec. delay.

Tail Fuze No. 862 Mks I and II (Service)

Data

Bombs used in.....A.S. 600-lb. Mk I
Action.....Hydrostatic; fixed 30 ft. depth setting
Armed condition.....When arming wire is withdrawn
Fuzes used with.....None
Body diameter .....2.0 in.
Over-all length .....5.5 in.
Color ..... Brass

Description: The fuze consists of an upper portion housing a water chamber with six water entry ports located in its side walls. This upper portion is sealed from the lower fuze body by a rubber diaphragm, which bears downward against the top of the striker. The striker is held in the raised position by two striker levers. One end of each lever engages a groove in the striker. The opposite end is pivoted in a spring-loaded lever block, which rides in a horizontal keyway. A detonator chamber housing a detonator shutter is located below and at right angles to the striker. A groove, in which rides the end of the striker, is cut in the upper side of the detonator shutter. In the unarmed condition the detonator shutter is held out of line with the striker by a safety wire. A shutter bellows is located on one end of the shutter, and a shutter spring on the other end. This spring resists the force of water pressure exerted on the shutter bellows and acts as the delay arming feature of the fuze. The lower part of the fuze body and the upper part of the magazine are threaded for insertion into the bomb. A rubber sealing ring and a locking ring are screwed onto these threads.

Operation: This fuze is designed so that it will not function or arm, except on water travel. Impact with a hard surface will cause a spring-loaded detent located above the detonator shutter to move down against its spring and lock the detonator shutter out of line with the striker. The striker levers are prevented from snapping the striker past dead center on hard surface impact by a shoulder on the detonator shutter. Upon the termination of the force of inertia after such impact, the spring-loaded lever blocks and levers return the striker to its raised position.

As the fuze enters the water, water flows in the entry ports in the water chamber and exerts pressure on the rubber diaphragm. At the same time pressure is exerted on the shutter bellows. Pressure on the rubber diaphragm forces the striker down, moving the levers downward and the lever blocks outward against their springs. When the levers have passed dead center, the springs behind the lever blocks force the blocks inward, and the levers then snap the

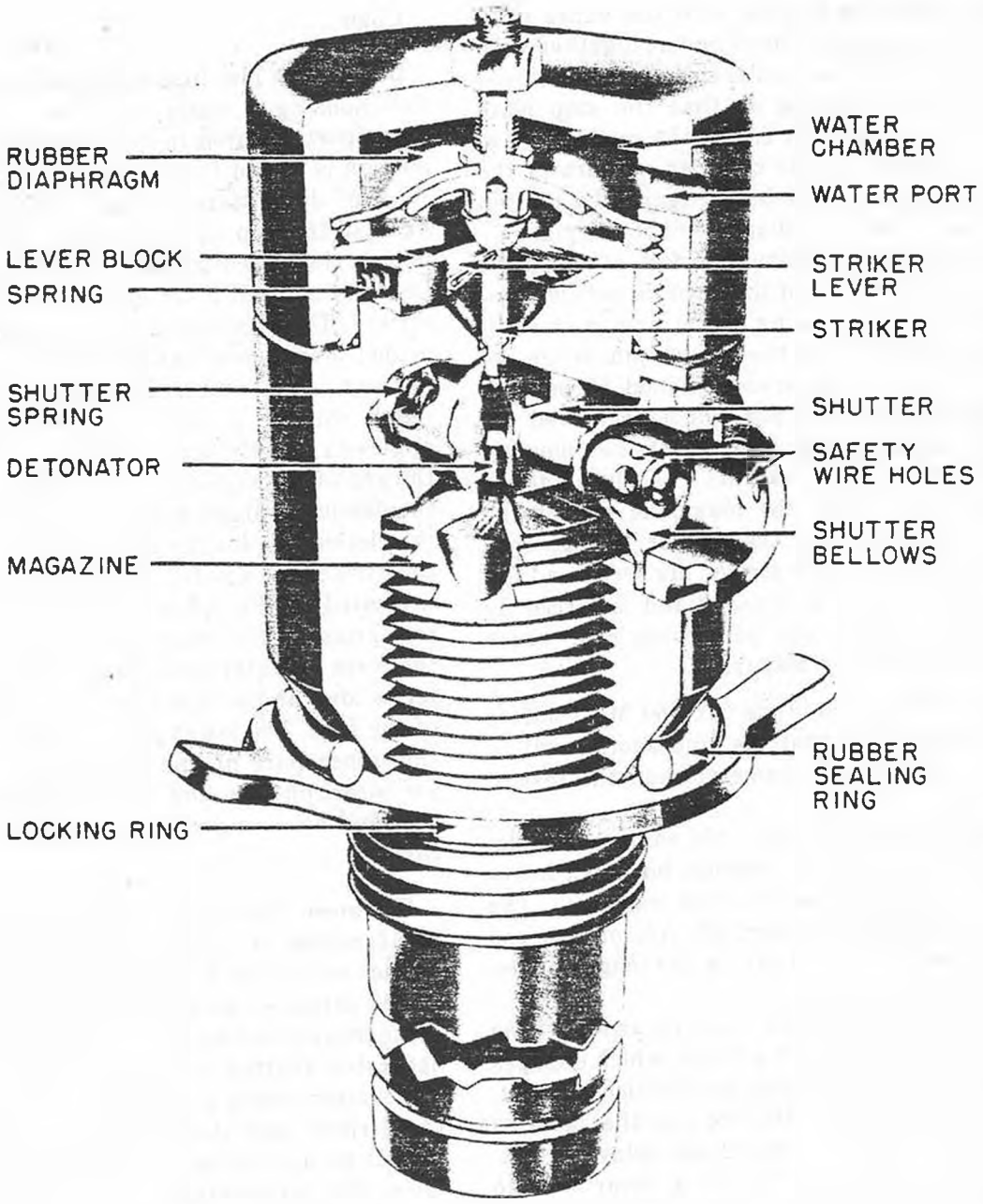

Figure 167—Tail Fuze No. 862

striker down into the detonator. The fuze will fire only after water pressure on the shutter bellows has aligned the detonator with the striker by compressing the shutter spring.

Remarks: An anti-countermining chamber in the fuze is designed to prevent the hydrostatic fuze from functioning from blast pressure caused by the explosion of another bomb nearby. A mushroom valve in the top of the chamber is closed by the sudden increase in hydrostatic pressure caused by such an explosion. When this sudden pressure passes, however, the valve opens again, and normal water pressure is allowed to exert its force against the fuze.

The fuze is set to explode at a depth of 30 feet of water. This setting cannot be altered.

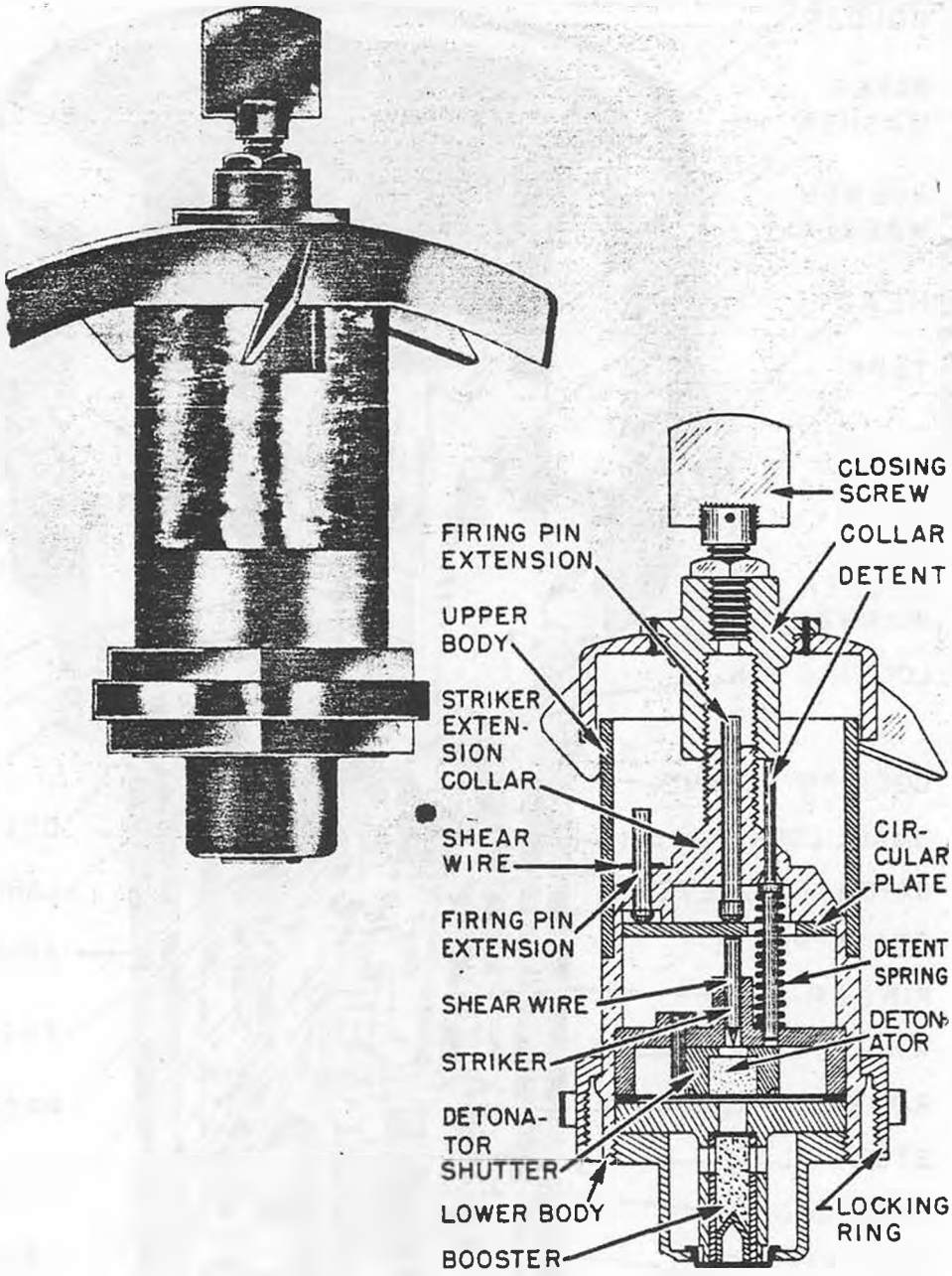

Figure 168—Nose Fuze No. 866 Mk I

Nose Fuze No. 866 Mk I (Obsolescent)

Data

Bombs used in .....A.S. 35 lb. Mks I and II
Action ..... Instantaneous on impact
Armed condition .....When vanes are off
Arming time .....7 revolutions of the vanes
Fuzes used with .....None
Body diameter .....2.25 in.
Vane span .....3.75 in.
Over-all length .....5.25 in.
Color .....Brass vanes, black plastic upper body, and brass lower body and locking ring

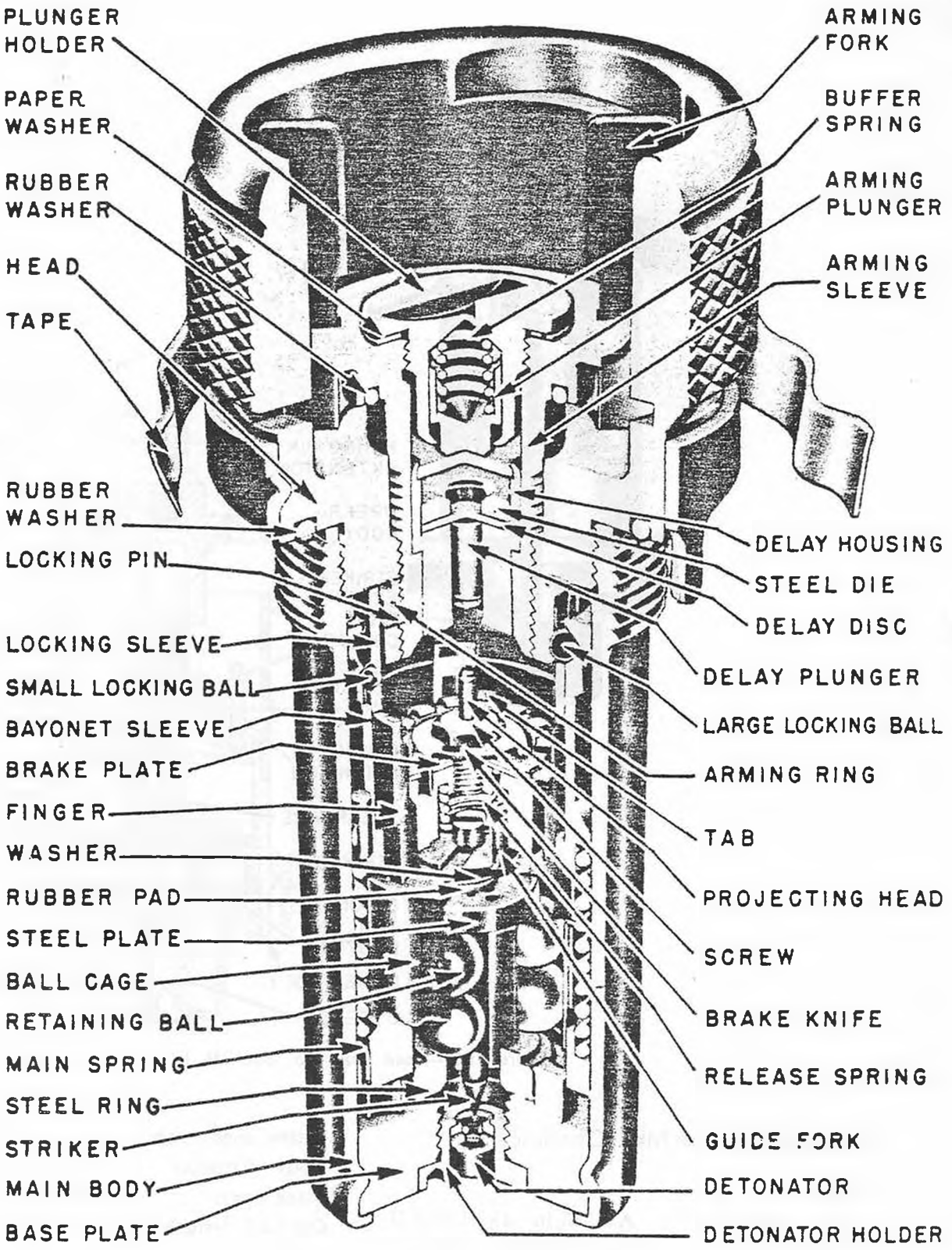

Figure 169—Tail Fuze No. 871 Mk I

Description: The five vanes and vane cap are cast in one piece. The vanes are staked to a threaded collar, which fits down into the fuze body and threads onto a striker extension collar. A closing screw with a vertically flattened head closes the upper end of the collar. A plastic upper body is incorporated to prevent premature firing due to collision of the bombs with each other in the air. Inside this plastic upper body, projecting through the brass collar, are three plastic firing-pin extensions, through each of which passes a copper shear wire. A fourth pin projects up through the center of the striker extension collar. A detent, which is spring-loaded forward, comes up beside the striker extension collar, and while in the unarmed positon, is held down by the threaded collar of the vane cap. The detent holds the spring-loaded detonator shutter out of line. Below the striker extension collar is a circular plate, resting on top of the striker, which is held in place by a shear wire. The detonator is carried in a shutter which is out of line with the striker in the unarmed condition. The booster cup extends down into the magazine, and has a cone in the bottom which gives it a cavity charge effect.

Operation: When the bomb is released from the plane, the safety wire is pulled and the vanes are then free to rotate. After seven revolutions they fall away, allowing the spring-loaded detent to move up out of the detonator shutter, which then aligns the detonator under the striker. On water impact, the plastic upper body shears away, exposing the four plastic firing-pin extensions. On impact with a hard surface, one or more of these extensions shear their shear pins and bear down against the circular plate, which transmits the pressure to the striker. The striker shear wire is broken, allowing the striker to be forced into the detonator. The flash from the detonator sets off the booster. The jet from the cavity charge in the base of the booster transmits the explosion to the exploder tube in the bomb.

Tail Fuze No. 871 Mk I (Soon in service)

Data

Bombs used in .....Any bomb in which a Tail Pistol No. 30 may be used
Action .....Long delay, and anti-disturbance
Armed condition ....When arming sleeve is screwed down
Fuzes used with .....None
Body diameter .....1.75 in.
Over-all length .....3.84 in.
Color .....Brass or steel

Description: This fuze is a combination long-delay, anti-disturbance tail fuze, and consists of a No. 881 fuze mechanism placed in a No. 28 pistol body. There is a deep V-slot cut through the base of the upper body, which is covered with adhesive tape. The detonator in this fuze is not shuttered.

Operation: When the bomb is released from the plane, the arming fork is rotated by the vanes and reach rod located in the standard British tail unit. Rotation of the arming fork screws the arming sleeve downward, until the rubber washer in the shoulder of the sleeve is firmly set against the top of the fuze body. This action brings the delay assembly adjacent to the extended portion of the screw in the top of the bayonet sleeve, and also brings the chamfered edge of the arming ring opposite the large locking ball, allowing the ball to move inward and partially disengage the bayonet sleeve from the locking seeve. Variation in the delay times of the fuze is accomplished by varying the length of the buffer spring. This varies the distance that the bayonet sleeve must force the delay assembly upward before the plunger begins to puncture the plastic delay disc.

On impact the bayonet sleeve moves downward by force of its inertia until stopped either by its main spring or contact with the top of the ball cage. This allows the small locking ball to move into a recess in the bayonet sleeve to disengage fully the locking sleeve from the bayonet sleeve.

Although the main spring is assembled under considerable torque tension, rotation has previously been prevented by the ball lock between the locking sleeve and the bayonet sleeve. The latter is firmly positioned by a pin extending down from the fuze body. The three upward-extending fingers of the ball cage engage in similar notches cut in the bottom edge of the

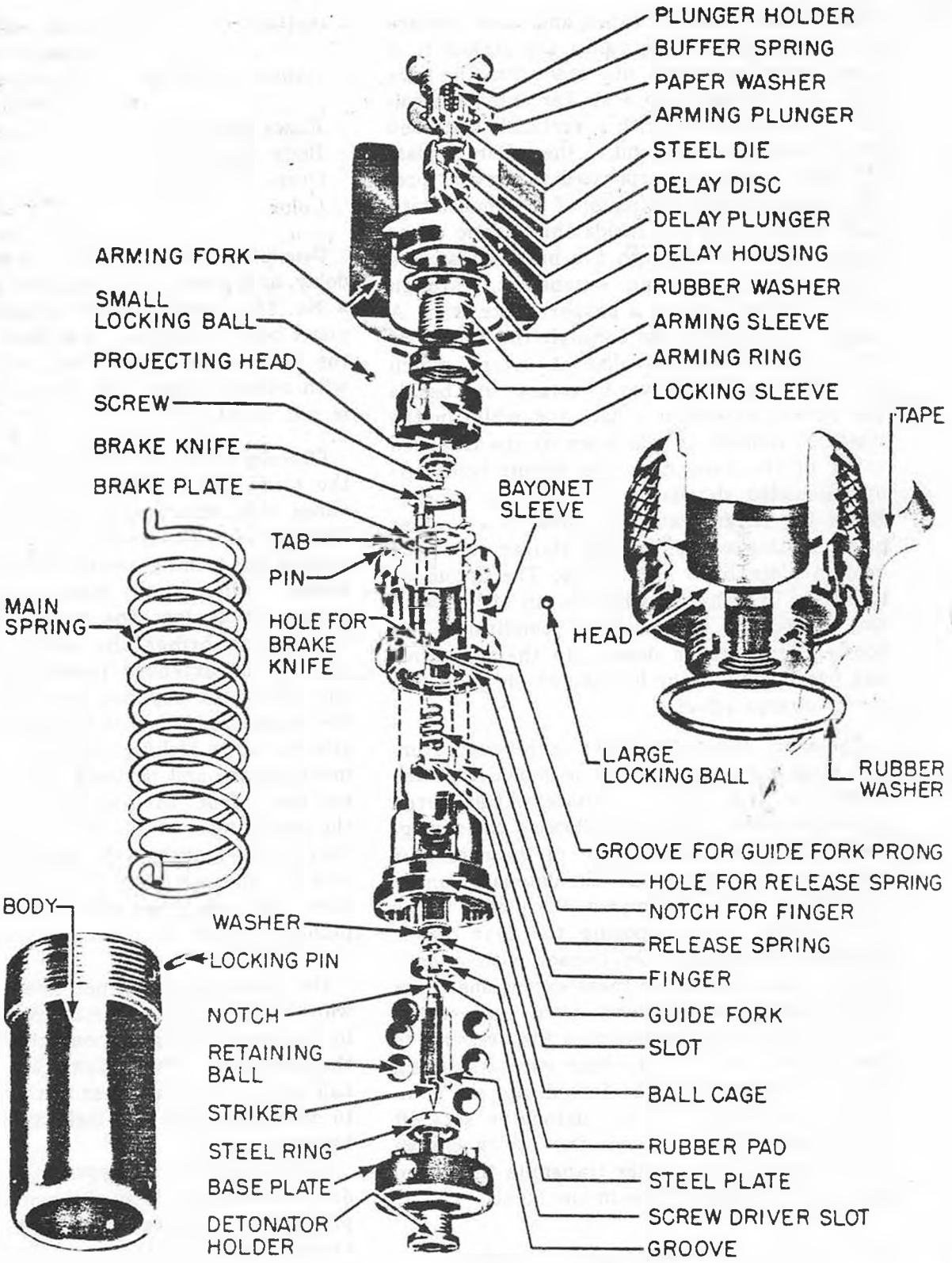

Figure 170—Exploded view of Tail Fuze No. 871 Mk I

locking sleeve. When the locking sleeve and the bayonet sleeves are disengaged, the main spring exerts its torque influence and commences to rotate the ball cage and locking sleeve in a clockwise direction. However, this rotational movement is slowed down by the brake plate and knife assemblies. The brake plate assembly consists of two perforated plastic discs held in a metal housing. Tabs in the outer edges of the brake-plate assembly are engaged by the three fingers of the ball cage, causing the assembly to rotate with the cage. The three knife edges of the brake knife extend downwards through the perforations in the brake-plate assembly and into three holes in the top of the bayonet sleeve. Therefore, the brake knife cannot rotate, but must cut through the plastic discs of the brake-plate assembly when the ball cage rotates. A small screw with a long projecting head holds the brake-plate and knife assemblies loosely in place. This screw threads into the top of the bayonet sleeve.

Located inside the ball cage are the striker and six retaining balls. The lower end of the release spring is fitted into a screw-driver slot in the top of the striker. The upper end of this spring engages a hole in the base of the bayonet sleeve. The spring itself is loaded under torque tension, and attempts to rotate the striker, but the striker is prevented from rotating by the guide fork. A notch cut in the upper portion of the striker is engaged in a slot cut in the guide fork, and two upward-extending prongs on the guide fork engage in similar grooves in the base of the bayonet sleeve. The six retaining balls are arranged, one on top of the other, in two layers of three balls each. In the unarmed position, these balls are held in place around the striker by the inner walls of the ball cage. The ball cage is prevented from rotating more than 60°, since the fingers of the cage come up against the ends of the slots in the base of the bayonet sleeve at the end of that distance. Rotation of the ball cage through 60°, however, presents cutaway portions of its inner walls to the balls. The balls are then prevented from scattering only by point contact between themselves, the steel ring placed around the striker above them, and the steel plate placed around the striker below the balls. When the ball cage has completed its 60° rotation, the fuze is fully armed.

A delay assembly in the top of the fuze consists of a housing containing a metal plunger and a plastic delay disc. When the bayonet sleeve is disengaged from the locking sleeve, the main spring forces the bayonet sleeve upwards, bringing the extended portion of the screw into contact with the plunger, which gradually forces its way through the delay disc. When the bayonet sleeve has risen sufficiently to disengage the prongs of the guide fork, the striker is allowed to rotate under the torque tension of the release spring. The flick motion imparted to the striker scatters the balls and allows the striker to be forced into the detonator by the main spring, working through the ball cage.

Disturbance of the fuze prior to its long-delay functioning will scatter the balls from under the striker, and the ball cage, under the compression of the main spring, will move downward, bringing the striker into contact with the detonator.

Remarks: The detonator in this fuze is not shuttered, but is at all times aligned with the striker. An internal weakening groove is cut around the inside of the head of the fuze, completely severing the fuze head except at four equi-spaced places, which are 0.2 in. wide. Alternatively, instead of the internal weakening groove, a deep V-groove may be cut around the outside of the fuze. The external open portions of the groove are covered with adhesive tape. The weakening groove ensures that the fuze head will shear at the weakened point rather than at another point where fuze functioning might be obstructed. It also increases the difficulty of identification by means of external fuze characteristics, and eliminates surfaces to which a wrench might be applied for extraction purposes.

Nose Fuze No. 873 Mk I (Service)

Data

Bombs used in .....F. 20-lb. and G.P. 40-lb.
Action .....Instantaneous on impact
Armed condition ....When the vanes and vane cap are off

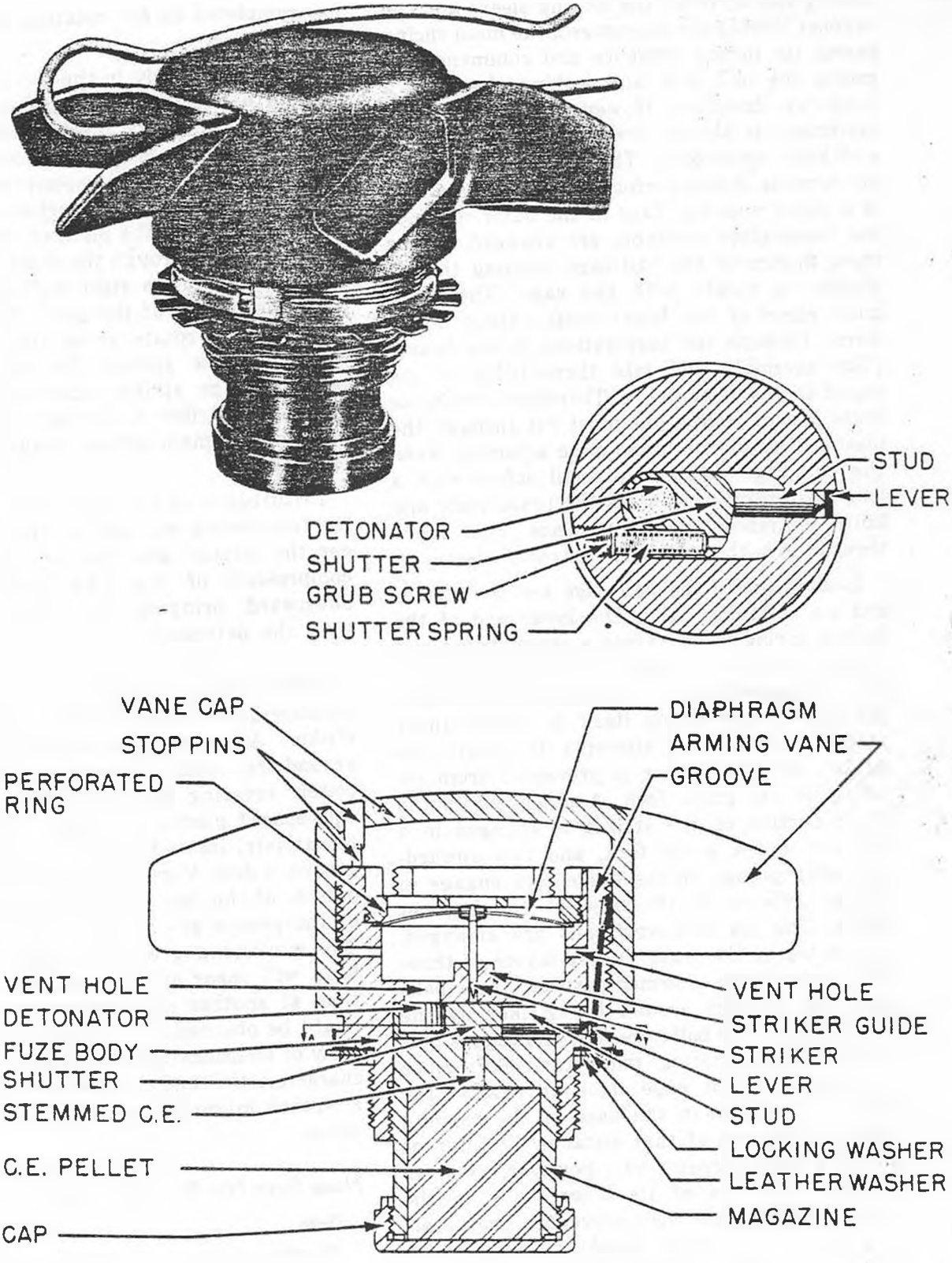

Figure 171—Nose Fuze No. 873 Mk I

Arming time .....12 revolutions of the vanes
Fuzes used with .....None
Vane span .....3.75 in.
Body diameter .....1.75 in.
Over-all length .....3.0 in.
Color .....Unpainted steel vanes and vane cap, and a brass body

Description: The vanes and vane cap of this fuze are of unpainted steel. The five vanes are cut out of one piece of sheet steel and soldered onto the cap. In the top of the cap is a small stop pin, which engages a stop pin on the fuze body to prevent the cap from being screwed down too tightly. The vane cap threads all the way down the fuze body. In the upper part of the fuze body is a sheet-metal diaphragm with a needle striker soldered to its center. This rests on a shoulder in the fuze body and is covered by a sheet-steel retaining disc in which seven holes are drilled to allow air passage. The retaining disc in this fuze is staked in place. In the lower fuze body is a detonator shutter moving in a chamber at right angles to the striker. In the unarmed position the shutter is out of line, and the detonator is lined up under a safety flash hole. On one end of the shutter is the shutter spring. On the other end is a detent, which holds the shutter out of line. The detent rests in a hole that leads to the outside and is held in the shutter chamber by a steel clip which rests in a longitudinal groove along the outside of the threaded fuze body. This clip is pivoted on its lower end, and there is continual pressure exerted on it by the detent, which, in turn, is being forced out by the shutter and shutter spring. Below the detonator is a flash channel leading to the magazine. Around the lower fuze body are a leather washer and a spring locking ring.

Operation: When the bomb is dropped from the plane, the safety wire is pulled out and the vanes and vane cap are free to rotate. After about 11 revolutions of the vanes, the vane cap releases the steel clip in the fuze body, allowing the clip to be pivoted down by the detent under pressure of the shutter and shutter spring. The detent is thus forced out of the fuze, and the shutter is allowed to align itself with the striker.

Remarks: This fuze is designed to give aerial burst functioning on all but the first bomb of a stick or cluster. The first bomb explodes on impact, and blast pressure from its explosion snaps the diaphragm of the fuze in the bomb next above it. Blast pressure from the explosion of the second bomb fires the third, etc., giving a "stepped" explosion effect to the whole stick or cluster.

Nose Fuze No. 874 Mk I (Service)

Data

Bombs used in .....250-lb. T.I. No. 8
Action .....Instantaneous on impact

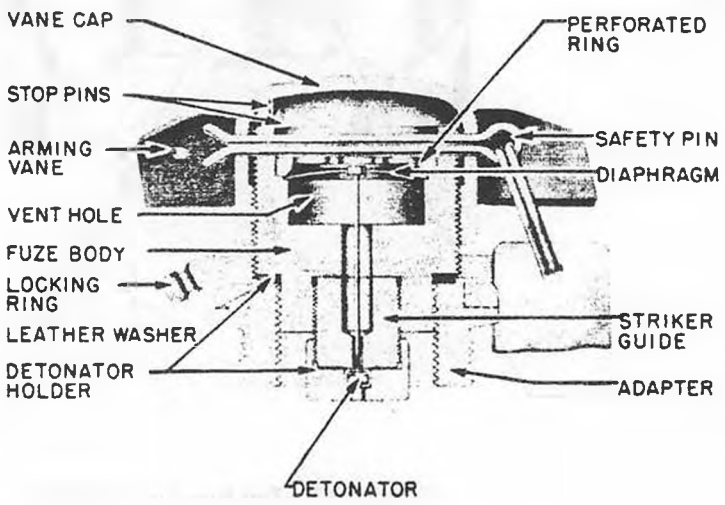

Figure 172—Nose Fuze No. 874 Mk I

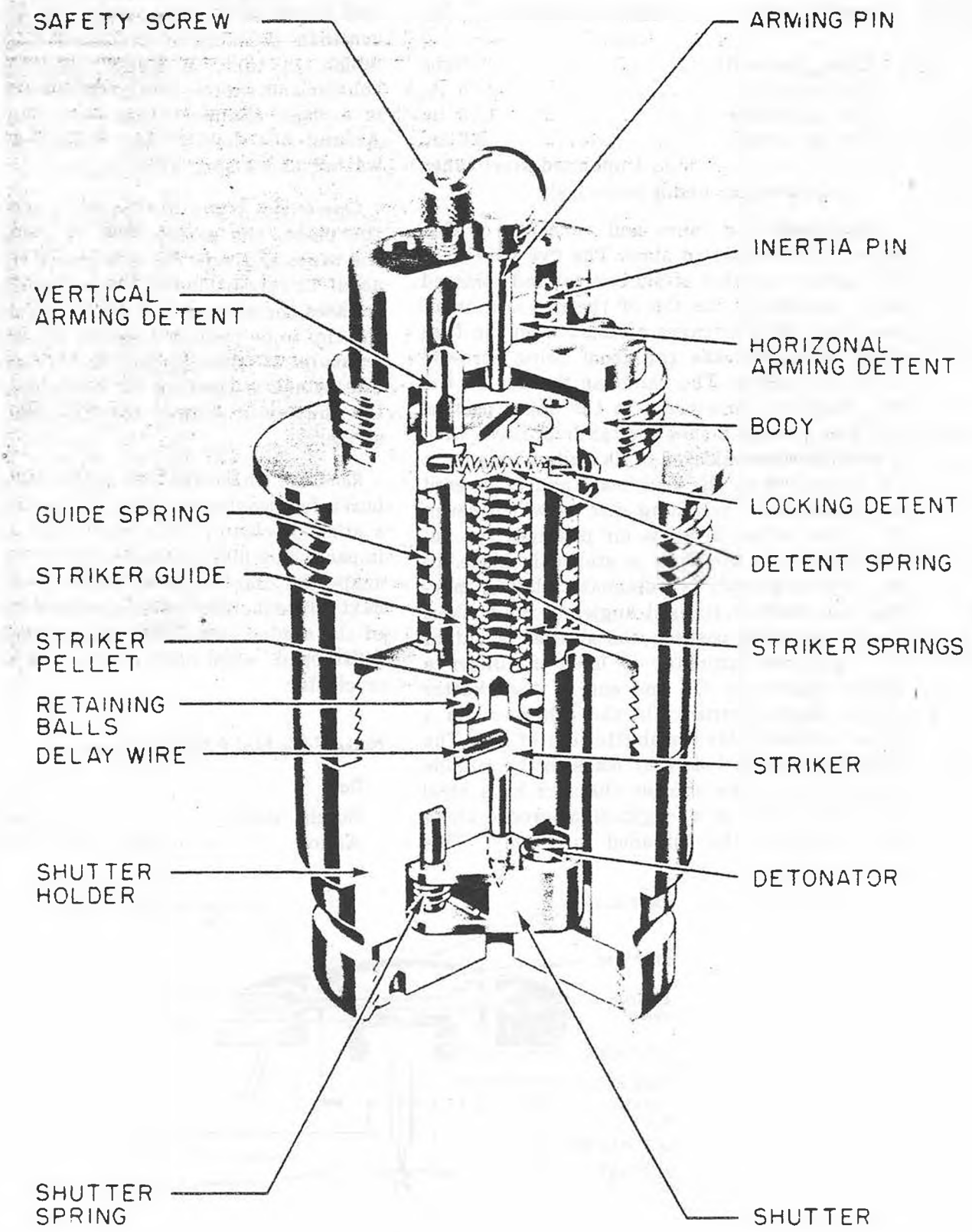

Figure 173—Tail Fuze No. 880 Mk II

Armed conditon.....When vanes and vane cap are off

Description: The pistol consists of a vane cap, body, striker guide, and detonator holder. It is similar in principle to the Pistol No. 45. The main constructional differences between the fuze and pistol are that the fuze includes a detonator, and has a brass adaptor to permit it to be threaded into the nose of a T.I. bomb.

Operation: The safety pin is removed when the bomb is loaded aboard the plane. Upon release, the arming vanes rotate up and off the fuze body, thus arming the fuze by exposing the diaphragm and retaining disc. On impact, the diaphragm is reversed by the compressed air beneath the fuze, and the striker is driven into the detonator.

Tail Fuze No. 880 Mks I and II (Service)

Data

Bombs used in .....F. 8-lb. Mk II
Action .....Fatigue-type long delay
Armed condition .....When safety screw is removed and arming pin withdrawn
Fuzes used with .....None
Arming time .....Instantaneous on impact
Body diameter .....2.2 in.
Over-all length .....3.35 in.
Color .....Brass body
Delay times ....½ min. to 6 hrs. at 50° F.

Description: The Fuze No. 880 Mk II consists of a brass body, bored centrally to house a striker guide and a striker-guide spring, which is located between a shoulder at the top of the striker guide and the top of the shutter holder. The shutter holder is of machined brass, and is threaded into the bottom of the fuze body. It contains a spring-loaded detonator shutter.

The striker guide contains a striker pellet under a double spring load from the two striker springs. An annular groove in the pellet is engaged by three retaining balls, located in holes in the striker guide, and prevented from moving outward by the walls of the shutter holder. Beneath the striker pellet, and loosely fitted to it, is a striker block and striker. A lead delay wire passes through the striker block and the striker guide. A horizontal channel bored in the top of the striker guide contains two spring-loaded locking detents. In the unarmed position, these detents bear against the walls of the fuze body.

The striker guide is held compressed against its spring by an arming pin and by the vertical arming detent. The vertical arming detent, in turn, is held in position by the end of the horizontal arming detent. The horizontal arming detent contains an inertia pin, which engages a hole in the top of the fuze body, preventing the horizontal detent from moving.

Safety during shipment and storage is provided by a threaded safety screw in the top of the fuze body, which prevents accidental removal of the arming pin. In addition, the end of the striker in the unarmed position fits into a blind hole in the detonator shutter and holds the detonator out of alignment.

Operation: The safety screw is removed manually when the bomb is loaded into its cluster, and the arming pin is withdrawn by the parachute shrouds as the parachute opens. The striker guide now is held depressed against its spring only by the series of arming detents.

On impact, the inertia pin in the horizontal arming detent moves downward against its spring, and the horizontal detent is allowed to be forced over the vertical arming detent, which is pushed upward by the striker guide and spring. When the striker guide rises, the two locking detents are forced into the enlarged recess in the top of the fuze body, firmly locking the striker guide in the raised position.

Simultaneously, the retaining balls are freed, and the spring-loaded striker pellet is forced against the striker block. The striker has been removed from the detonator shutter, which is now caused by its spring to align the detonator with the striker.

The entire force of the twin striker springs now bears against the delay wire, which eventually shears and allows the striker to pierce the detonator, initiating the bomb.

Remarks: The Fuze No. 880 is a fatigue-type long-delay fuze with delay times designed to vary from ½ min. to 6 hr. at 50° F. The designed delay time is set during the manufacture of the fuze and cannot be altered. The nominal

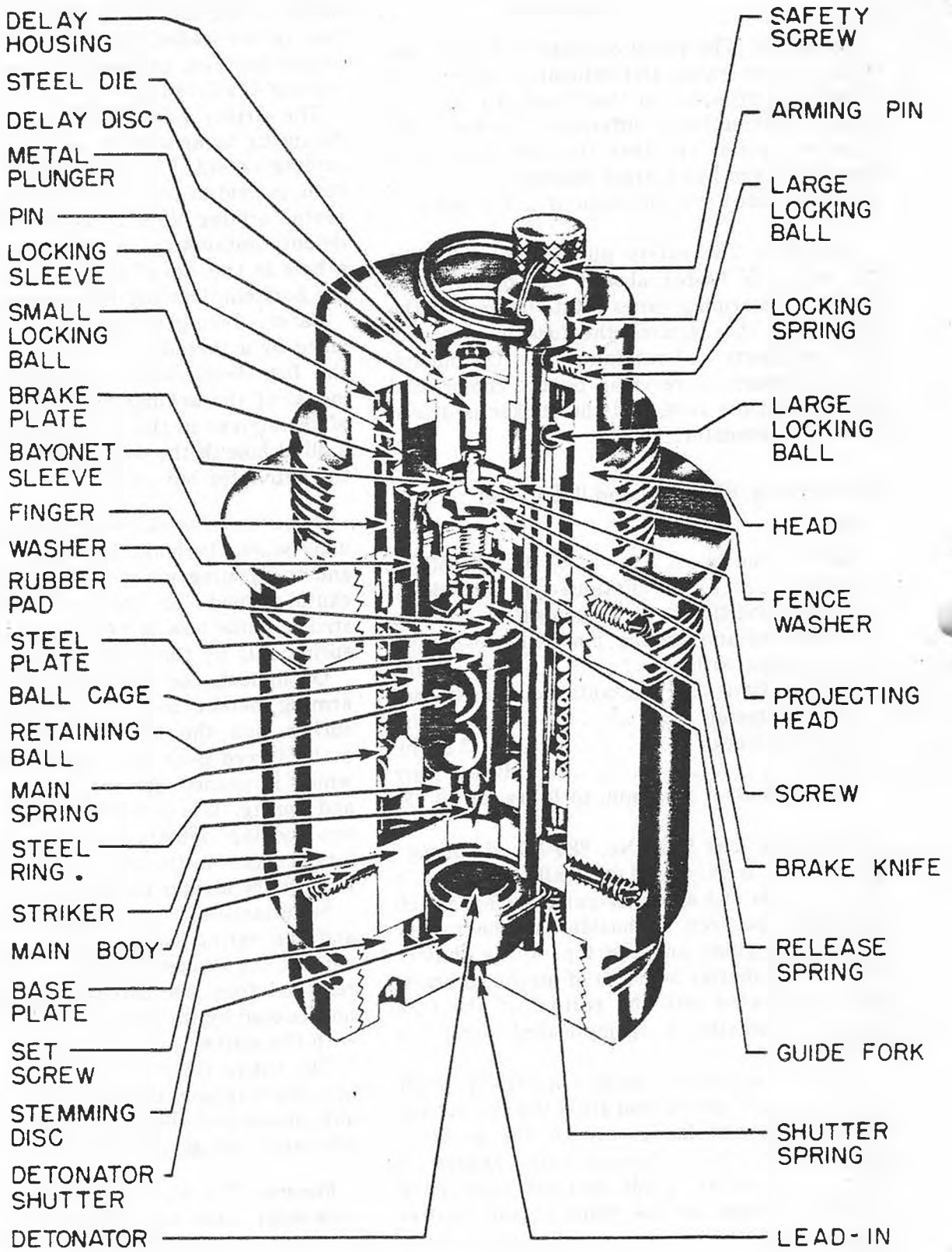

Figure 174—Tail Fuze No. 881 Mk I

delay time cannot be ascertained from the external appearance of the fuze. At temperatures higher or lower than 50° F., the delay times will vary considerably from those for which the fuzes were designed. At below freezing temperatures the fuze has been known to delay 26 hours before functioning.

The No. 880 Mk I is an earlier model of the Fuze No. 880 Mk II, and is identical to the Mk II, except that the arrangement of the shutter holder is slightly different.

Tail Fuzes No. 881 Mk I and No. 883 Mk I

Data

Bombs used in .....F. 8-lb. Mk II
Action .....No. 881, long delay and anti-disturbance; No. 883, anti-disturbance
Armed condition .....When safety screw is removed and arming pin withdrawn
Fuzes used with .....None
Body diameter .....2.2 in.
Over-all length .....3.35 in. (without arming pin)
Color .....Brass or steel

Description: The Fuze No. 881 Mk I is a combination long-delay and anti-disturbance fuze, while the No. 883 Mk I is anti-disturbance only. These fuzes are identical except that a brass plug replaces the delay assembly in the No. 883. Both are similar in external appearance to the Fuze No. 880 Mk II, the only difference being that the arming pins in the No. 881 and No. 883 are set off-center, while that of the No. 880 follows the central axis of the fuze.

Operation: When the fuzed bomb is fitted into the cluster, the safety screw is removed and the arming pin is linked to the parachute. When the bomb is released from the cluster, the parachute opens and withdraws the arming pin. This allows the detonator shutter to align the detonator with the striker, and the two large locking balls to move into the space vacated by the arming pin. The upper locking ball serves merely to seal the arming-pin hole. The release of the lower locking ball partially disengages the locking sleeve from the bayonet sleeve.

On impact the bayonet sleeve moves downward by force of its inertia until stopped either by the main spring or by contact with the top of the ball cage. This allows the small locking ball to move into a recess in the bayonet sleeve to disengage fully the locking sleeve from the bayonet sleeve.

Although the main spring is assembled under considerable torque tension, rotation has been previously prevented by the ball lock between the locking sleeve and the bayonet sleeve. The latter is firmly positioned by a pin extending down from the fuze body. The three upward-extending fingers of the ball cage engage in similar notches cut in the bottom edge of the locking sleeve. When the locking sleeve and the bayonet sleeve are disengaged, the main spring exerts its torque influence and commences to rotate the ball cage and locking sleeve in a clockwise direction. However, this rotational movement is slowed down by the brake-plate and knife assemblies. The brake-plate assembly consists of two perforated plastic discs held in a metal housing. Tabs in the outer edge of the brake-plate assembly are engaged by the three fingers of the ball cage, causing the assembly to rotate with the cage. The three knife edges of the brake knife extend downward through the perforations in the brake-plate assembly and into three holes in the top of the bayonet sleeve. Therefore, the brake knife cannot rotate, but must cut through the plastic discs of the brake-plate assembly when the ball cage rotates. A small screw with a long projecting head holds the brake-plate and knife assemblies loosely in place. This screw threads into the top of the bayonet sleeve.

Located inside the ball cage are the striker and six retaining balls. The lower end of the release spring is fitted into a screw-driver slot in the top of the striker. The upper end of this spring engages a hole in the base of the bayonet sleeve. The spring itself is loaded under torque tension, and attempts to rotate the striker, but the striker is prevented from rotating by the guide fork. A notch cut in the upper portion of the striker is engaged in a slot cut in the guide fork, and two upward-extending prongs on the guide fork engage in similar grooves in the base of the bayonet sleeve. The six retaining balls are arranged, one on top of the other, in two layers of three balls each. In the unarmed position, these balls are held in place around the striker by the inner walls of the ball cage.

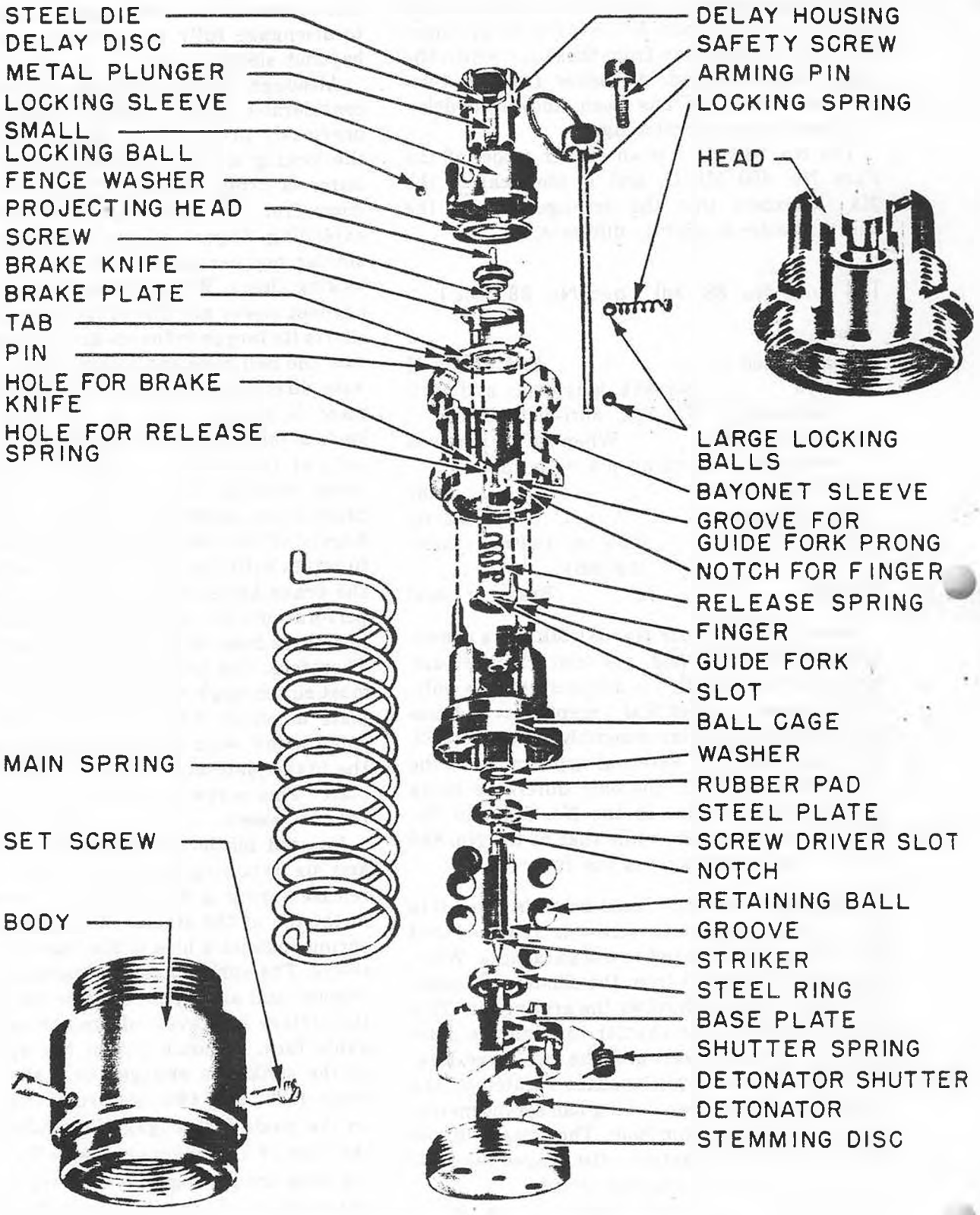

Figure 175—Exploded view of Tail Fuze No. 881 Mk I

The ball cage is prevented from rotating more than 60°, since the fingers of the cage come up against the ends of the slots in the base of the bayonet sleeve at the end of that distance. Rotation of the ball cage through 60°, however, presents cut-away portions of the inner walls to the balls. The balls are then prevented from scattering only by point contact between themselves, the steel ring placed around the striker above them, and the steel plate placed around the striker below the balls. When the ball cage has completed its 60° rotation, the fuze is fully armed.

A delay assembly in the top of the fuze consists of a housing containing a metal plunger and a plastic delay disc. When the bayonet sleeve is disengaged from the locking sleeve, the main spring forces the bayonet sleeve upwards, bringing the extended portion of the screw into contact with the plunger, which gradually forces its way through the delay disc. When the bayonet sleeve has risen sufficiently to disengage the prongs of the guide fork, the striker is allowed to rotate under the torque tension of the release spring. The flick motion imparted to the striker scatters the balls and allows the striker to be forced into the detonator by the main spring working through the ball cage.

Disturbance of the fuze prior to its long-delay functioning will scatter the balls from under the striker, and the ball cage, under the compression of the main spring, will move downward, bringing the striker into contact with the detonator.

Tail Fuzes No. 895 Mk I and No. 875 Mk I (Service)

Data

Bombs used in...No. 895—A.S. 100-lb. Mk VI, and A.S. 600-lb. Mk I; No. 875—A.S. 100-lb., Mk IV, A.S. 25-lb. Type A Mk I, and A.S. 600-lb. Mk I

Action .....Hydrostatic

Armed condition.....When safety wire is removed

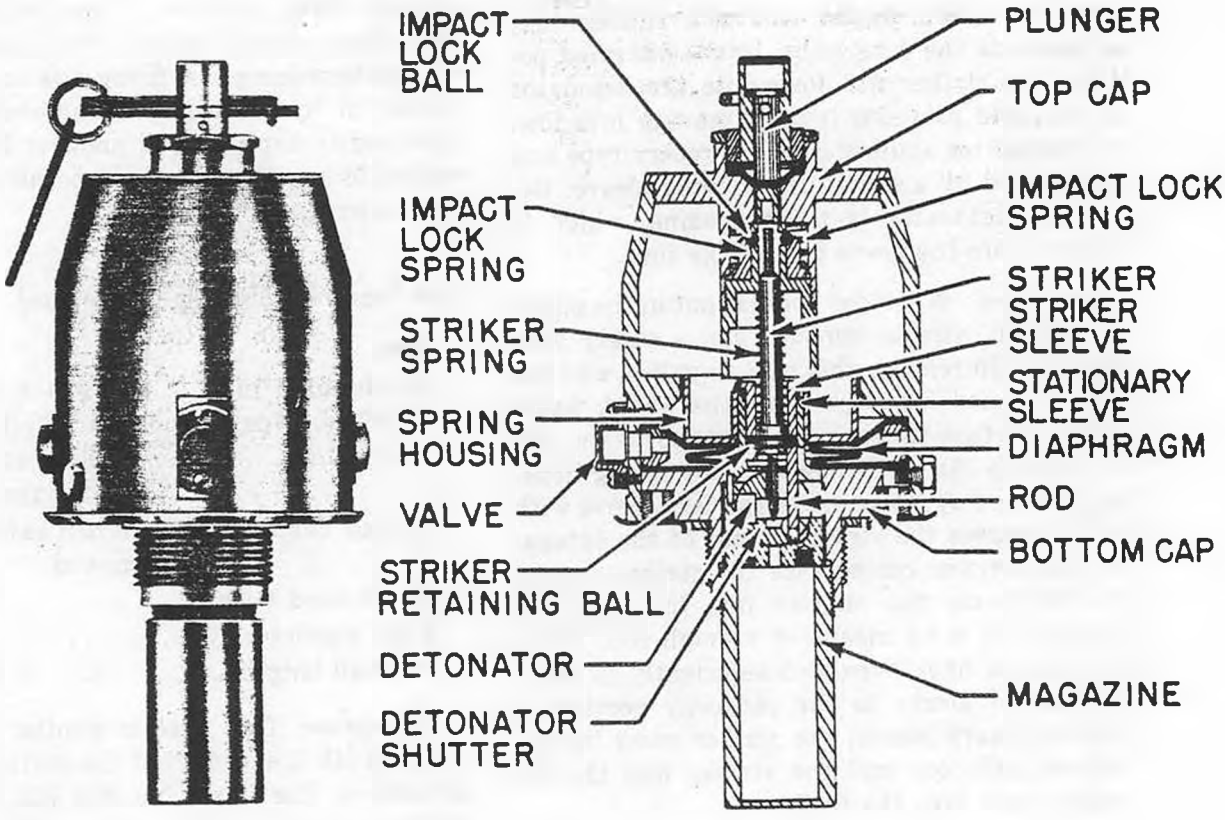

Figure 176—Tail Fuze No. 895 Mk I

Fuzes used with .....None
Body diameter .....2.9 in.
Over-all length .....7.2 in.

Description: Around the sides of the No. 895 fuze body are water entry ports, protected by small spring-loaded valves, which serve as anti-counter-mining devices. The water ports lead into a rubber bellows, which rests on a shoulder of the fuze body and also under the spring housing. Inside, and resting on the upper lip of the spring housing, is a striker sleeve with two holes drilled in it to accommodate two retaining balls. The balls rest in a groove of the spring-loaded striker and hold it back.

Around the striker sleeve is a stationary sleeve having a cut-away top into which the retaining balls can move. On the upper end of the striker is a lock sleeve, which is held down by a spring and which holds retaining balls in a fixed housing. This device functions to prevent the action of the fuze when the bomb lands on its tail. Through the top of the fuze is drilled a hole into which is fitted a safety plunger, through which the safety and transit wires are fitted. Below this is a rubber disc, which seals the fuze body. In the unarmed position the striker fits down into the detonator shutter and prevents it from moving into line. The detonator shutter is of the rotary type and is attached by a rod to the moving sleeve. Below the detonator is the magazine, which is screwed into the lower part of the fuze.

Operation: When the bomb is put in the plane, the transit wire is removed and a safety wire inserted. On release, this wire is pulled, and the fuze is armed. Upon entering the water, water enters the fuze through the entry ports and fills the bellows. As the bellows fill, the spring housing is moved up, carrying the striker sleeve with it. This moves the striker up out of the detonator shutter and compresses the striker spring. It also moves the shutter into line, as it is attached to it by means of a small rod. When the bellows have expanded sufficiently to move the striker sleeve to the cut-away portion of the stationary sleeve, the striker cams the retaining balls out and the striker hits the detonator and fires the fuze.

Remarks: Two issues of the No. 895 Mk I type of fuze are at present in service use. The Fuze No. 895A Mk I, with a setting of 18 ft., is used in the A.S. 100-lb. Bomb Mk VI. The Fuze No. 895/30 Mk I, with a setting of 30 ft., is used in the A.S. 600-lb. Bomb Mk I. The designation of the later issue of the No. 895 Mk I type was altered to include the nominal depth setting. Changes in depth setting are accomplished by the insertion of an additonal spring between the top cap of the fuze and the spring housing.

The Fuze No. 875 is similar to the No. 895, except that more positive detonator-shutter action has been provided in the latter. The depth settings of the No. 875 are set by the manufacturer and are designed for different uses. The Fuze No. 875A, whose red color indicates an 18-ft. depth setting, is used with A.S. 100-lb. Bomb Mk IV. The Fuze No. 875B, whose blue color indicates a 22-ft. depth, is used in the A.S. 25-lb. Bomb Type A Mk I. The Fuze No. 875C, whose green color indicates a 30-ft. depth setting, is used in the A.S. 600-lb. Bomb Mk I.

The fuzes will not fire on a normal hard-surface impact, as such an impact causes no movement of the operating mechanism. If the bomb should strike tail-first, firing is prevented by the lightly spring-loaded lock sleeve.

Countermining, i.e. firing due to a sudden increase in hydrostatic pressure resulting from the nearby explosion of another bomb, is prevented by small spring-loaded valves fitted over the water entry ports.

Tail Fuze No. 895 Mk II (Service)

Data

Bombs used in.....A.S. 100-lb. Mk VI, A.S. 250-lb. Type C, and A.S. 600-lb. Mk I
Action.....Hydrostatic firing, and centrifugal arming
Armed condition.....When safety pin is removed
Fuzes used with .....None
Body diameter .....2.9 in.
Over-all length .....8 in. (approx.)

Description: This fuze is similar to the Fuze No. 895 Mk I, except that the method of arming is altered. The Fuzes No. 895 Mk II are armed by the rotation of the vanes and tie-rod incorporated in the standard British tail assembly. The tie-rod engages the T-bar of the fuze and

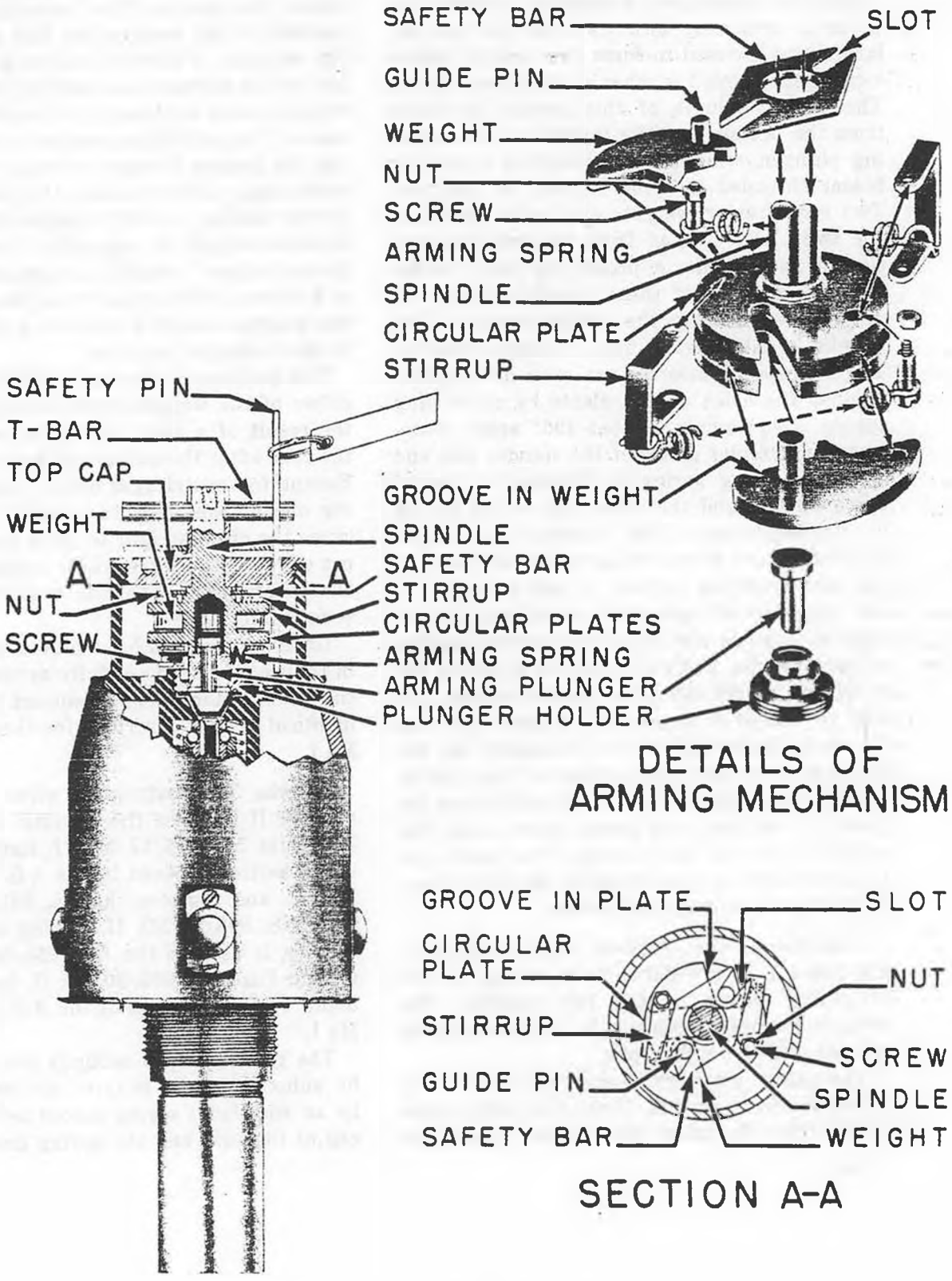

Figure 177—Tail Fuze No. 895 Mk II

rotates the centrifugal arming mechanism. This mechanism consists of a spindle, to which the T-bar is attached, with its lower portion enlarged and grooved to form two circular plates located one above the other about ¼ inch apart. The central column of this spindle is drilled from the bottom to allow insertion of the arming plunger, which is supported by a plunger holder threaded into the top cap of the fuze. Two semicircular weights are located between the two plates formed from the enlarged portion of the spindle. A projecting point on the flat edge of each of these weights blocks any upward movement of the arming plunger. Each weight is held inward by a U-shaped stirrup. The stirrups themselves are each held tightly against the sides of the plates by an arming spring. Two screws, located 180° apart, penetrate the circular plates of the spindle. One end of each arming spring is fastened to one of these screws, and the other end of the spring is attached to one of the stirrups. Each screw also serves as a pivot for one of the weights and the corresponding stirrup. A nut threaded to the upper end of each screw completes this assembly. A guide pin is set into the top surface of each weight. Each pin rides in a groove cut in the upper circular plate on the spindle and also is located in a slot cut in each end of a diamond-shaped safety bar. This safety bar fits freely around the upper portion of the spindle. A safety pin engages the T-bar, penetrates the cover of the fuze, and passes down along the outside of one of the stirrups. The safety pin thus holds one of the weights securely in position during storage and transit.

Operation: In the unarmed position, the arming plunger is prevented from rising by the projecting points of the two weights. The weights are held in position both by the arming springs and the safety pin.

The safety pin is removed when the fuze is assembled in the bomb. When the bomb is released from the plane, the arming vanes and tie-rod in the tail, which engages the T-bar, rotate the spindle. The centrifugal force imparted by the rotation of the spindle causes the weights to pivot outwards against the action of the stirrups and arming springs. As the weights move outwards, the central hole in the base of the spindle is completely cleared, allowing the arming plunger to move upward when hydrostatic action causes the striker to rise. Before arming is fully completed, the weights have moved out far enough so that a groove in the end of each weight is engaged by the edge of a stirrup. When rotation of the vanes ceases, the weights are thus prevented from returning to their original position.

The purpose of the safety bar is to prevent either of the weights from moving outward as the result of a hard jolt or jar on the side of the fuze after the safety pin has been removed. Except for centrifugal action, any force causing one of the weights to move outward will cause the other weight to move inward, and the net effect of the force will be equalized through the safety bar, with the result that neither weight will move.

Once the weights have moved out and lock in position, the fuze is fully armed. Except for the offset detonator, subsequent functioning is identical to that described for the Fuze No. 895 Mk I.

Remarks: The designation given to Fuzes No. 895 Mk II includes the nominal depth setting. The Fuze No. 895/18 Mk II, having an 18 ft. depth setting, is used in the A.S. 100-lb. Bomb Mk VI, and replaces the No. 895A Mk I. The Fuze No. 895/23 Mk II, having a 23-ft. depth setting, is used in the A.S. 250-lb. Bomb Type C. The Fuze No. 895/30 Mk II, having a 30-ft. depth setting, is used in the A.S. 600-lb. Bomb Mk I.

The greater depth settings are accomplished by substitution of heavier striker springs, or by an additional spring placed between the top cap of the fuze and the spring housing.

Part 2—Chapter 4

DETONATORS

Introduction

The main explosive charge of aircraft bombs is relatively insensitive. To effect detonation, a train of more sensitive explosives is normally used, which may be either of two types: the fuze-exploder-main-charge type, or the pistol-detonator-exploder-main-charge type. The distinction between fuzes and pistols, as made in the introduction to Part 2, pointed out that fuzes have the initiating explosive charge incorporated in them, while pistols contain no explosive whatsoever, but merely act as a mechanical device to activate the initiating explosive in a detonator inserted separately in the bomb.

Detonators are of two types, the anvil type employed with pistols having a blunt striker, and the sensitive type employed with pistols having a needle striker. Furthermore, they may be instantaneous in functioning, or may have a delay of from 0.025 sec. to 11 sec. for the anvil type, or 0.01 to 25-30 sec. for the sensitive type.

The most sensitive explosive in the pistol-detonator firing train is usually contained in the percussion cap of the detonator cap, and is fired by impact or friction. The flash from the cap composition fires a less sensitive composition known as the detonating composition, which in turn initiates a still less sensitive explosive called the exploder, whose explosion initiates the main charge. Sensitive-type detonators, however, have no percussion cap or anvil.

Detonators are filled with very sensitive high explosives which will explode if they are subjected to sudden shock or even a light blow, or are subjected to heat. It is essential that all detonators be handled with great care. The cap composition usually used in British detonators is A.S.A. mixture, composed of lead azide and lead styphnate. Fulminate of mercury is also used. Formerly, C.E. (tetryl) and TNT were used in the exploder, but the use of TNT is being discontinued and C.E. alone is now being used.

Bombs employing a pistol-detonator combination are generally shipped with the pistol in place, but without the detonator, which is inserted prior to loading on the plane after first removing the pistol. In small bombs (500 lb. or under), the detonator generally fits into the exploder, whereas in larger bombs it is housed in a detonator holder, which threads into the exploder container and is threaded itself to receive the pistol.

Anvil-Type Detonators

Anvil-type detonators are used with pistols having blunt strikers. There are two classes of anvil-type detonators: those which employ a Cartridge Base No. 28, complete with percussion cap and anvil for their initiation, and those in which a percussion cap is housed over an anvil in a recessed plug, which screws into the head of the detonator. These two classes are called the "cartridge-base" and "anvil-plug" classes, respectively. The cartridge-base class was used in bombs which are now obsolete, whereas the anvil-plug class is currently used in service bombs which employ the anvil-type detonator.

The cartridge-base class of anvil-type detonators is identifiable by a code of colors, associated with their delays. The code color is painted on the detonator head, and a corresponding colored washer label is affixed to the head. The code of colors is as follows:

Delay	Color
Less than 1 second	White
1 sec. and less than 2.5 sec.	Yellow
2.5 sec. and less than 11.5 sec.	Green
11.5 sec. to 15 sec.	Blue

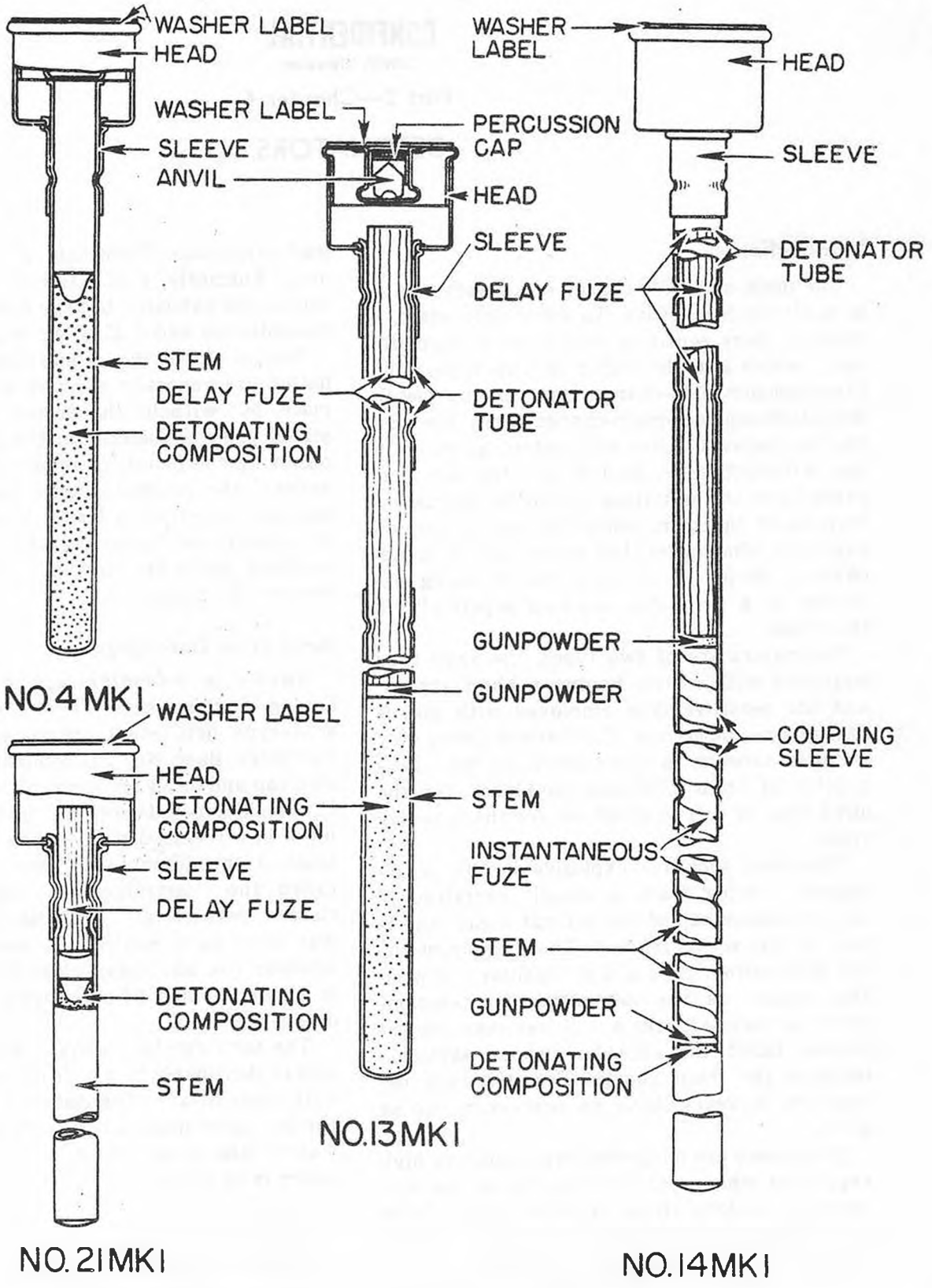

Figure 178—Examples of the Cartridge-Base Class of Anvil-Type Detonators

The anvil-plug class of anvil-type detonators is also identifiable by a code of colors applied as a band, 3/8 in. wide, painted around the detonator head, and a correspondingly colored washer label, affixed to the plug, bearing the following particulars: type and mark number, date of filling, filling contractor's initials or recognized trade mark, lot number, and delay. The color code indicating delay is as follows:

Delay	Color
Instantaneous	White
0.025 seconds	Black
0.12 seconds	Brown
1.0 seconds	Yellow
11 seconds	Blue

Sensitive Detonators

The sensitive-type detonators are employed with pistols having needle strikers in bombs in which sensitive-type initiation of the explosive train is desired. Sensitive-type detonators differ from the anvil type in that no percussion cap and anvil are provided, and they are made to a standard length of approximately 3.5 inches. Hence, they are interchangeable in service bombs, and are selected according to the delay incorporated in them. They may be identified as a class by the stem, which is painted green for a length of one inch from the closed end, and by a green label secured to the detonator plug with shellac and varnished over.

Sensitive detonators consist of a stem, and a head into which is screwed a detonator plug. The lower portion of the stem contains a quantity of detonating composition, usually A.S.A. mixture and C.E. In delay detonators, the upper portion of the stem accommodates a sleeve, which contains a quantity of delay composition, the sleeve being retained in position by the detonator plug. The initiating detonator consists of a small metal cup having a flash hole through its base. This hole is covered by a thin disc, above which is a small charge of cap composition covered by a metal disc, a paper disc

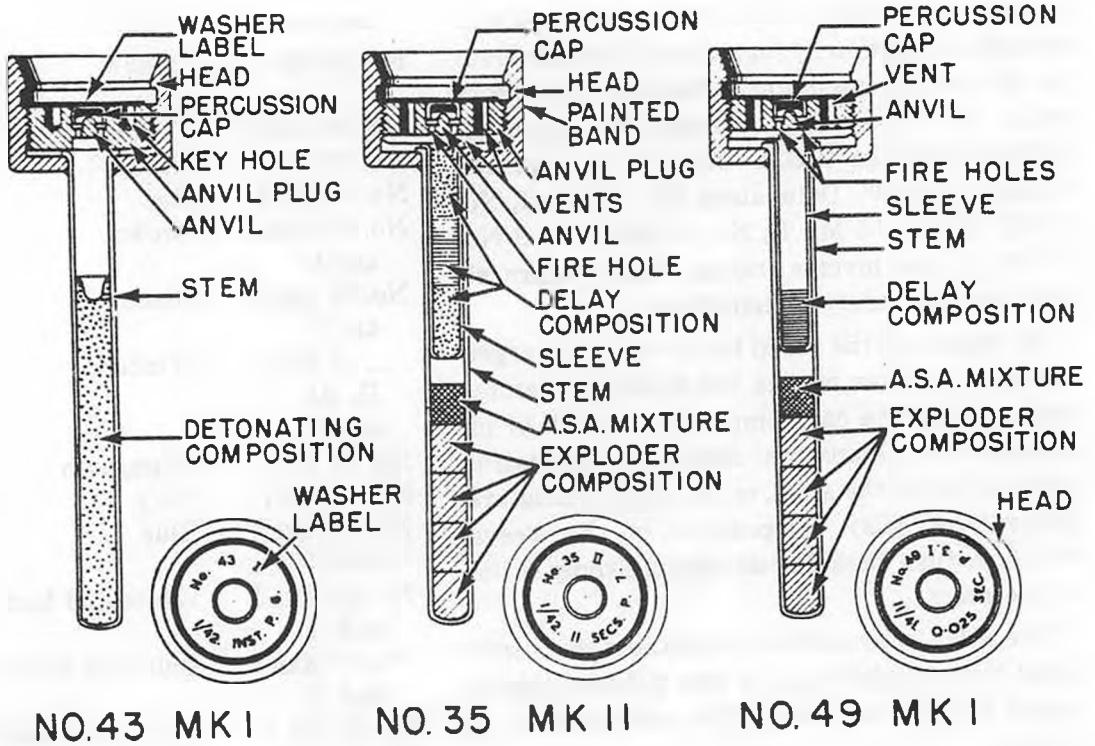

Figure 179—Examples of the Anvil-Plug Class of Anvil-Type Detonators

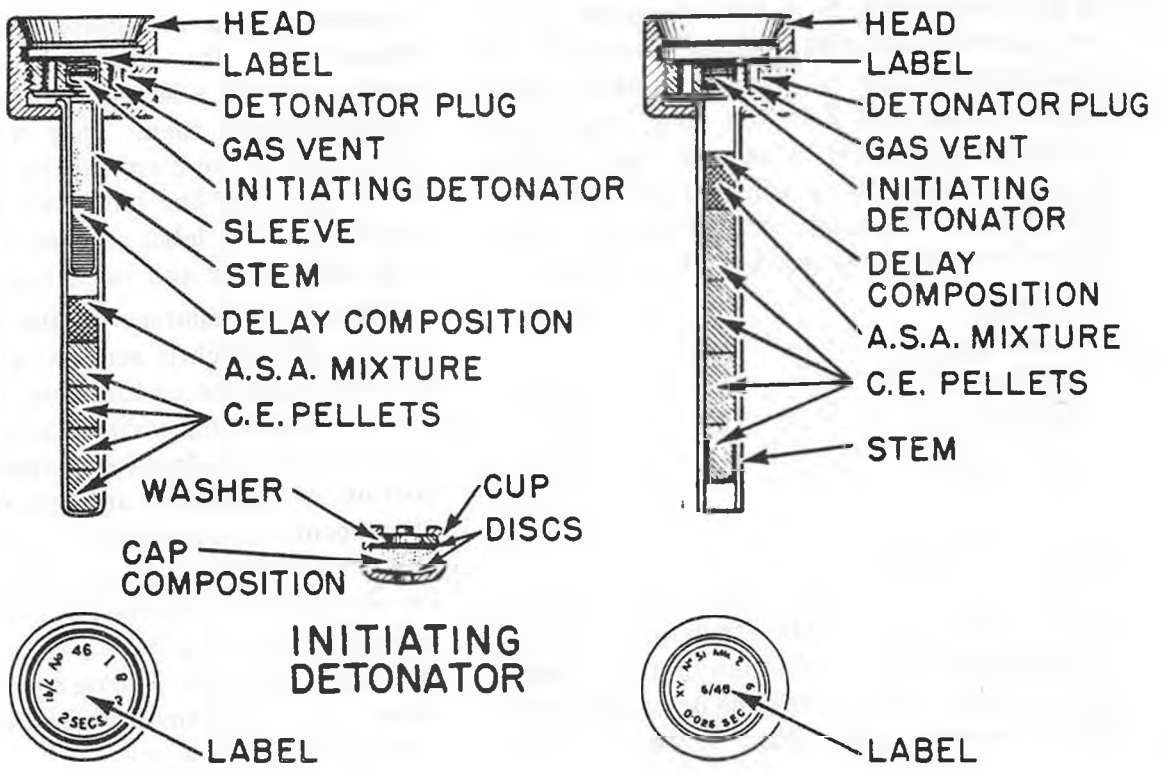

Figure 180—Examples of the Sensitive-Type Detonators

secured with shellac, and a metal washer, which are held in position by lugs turned inwards from the rim of the cup onto the washer. Detonators which have the delay composition located directly above the A.S.A. mixture, are termed "inverse loaded". Detonators No. 50 Mk II, No. 51 Mk II, No. 55 Mk II, No. 56 Mk II, and No. 57 Mk II are inverse loaded. This feature allows greater safety in handling.

On impact of the fuzed bomb with the target, the pistol striker pierces the initiating detonator and fires the cap composition, which in instantaneous detonators fires the detonating composition in the stem, or, in delay detonators, ignites the delay composition in the sleeve, which in turn fires the detonating composition in the stem.

The delay of sensitive-type detonators is indicated by a single 3/8-in., or two 3/16-in. colored bands around the head. The color code is as follows:

Detonator	Color	Delay
No. 39 Mk I	Yellow	1 sec. (Obsolescent)
No. 39 Mk II	Yellow	1 sec.
No. 46 Mk I	Green	2 sec.
No. 48 Mk I	Red	0.04 sec.
No. 50 Mks I and II	Brown	0.14 sec.
No. 51 Mks I and II	Black	0.025 sec.
No. 52 Mks I, II, III, and IV	White	None
No. 53 Mk I	Aluminum	0.5 sec.
No. 54 Mk I	Grey	3 sec.
No. 55 Mks I and II	Blue	11 sec.
No. 56 Mks I and II	White and Red	0.05 sec.
No. 57 Mks I and II	Blue and Yellow	25-30 sec.
No. 59 Mk I	White and Black	0.01 sec.
No. 60 Mk I	White and Brown	0.07 sec.

ANVIL-TYPE DETONATORS

Cartridge-Base Class (Obsolete)

Detonator	Color Code	Delay	Length	Filling	Bombs Used In
No. 4 Mk I	White	None	3.3 in.	Cap composition, and detonating composition	R.L. 112-lb. Mks VII and VIIC G.P. 120-lb. Mks I and II G.P. 250-lb. Mks I, II, and III G.P. 500-lb. Mks I, II, and III
No. 13 Mk I	Blue	12 sec.	7.1 in.	Cap and detonating composition, delay and instantaneous fuze, and gunpowder	R.L. 112-lb. Mks VII and VIIC
No. 14 Mk I	Blue	15 sec.	13.6 in.	Cap and detonating composition, delay and instantaneous fuze, and gunpowder	G.P. 120-lb. Mks I and II G.P. 250-lb. Mks I, II, and III
No. 18 Mk I	White	None	37.6 in.	Cap and detonating composition, instantaneous fuze, and gunpowder	G.P. 500-lb. Mks I, II, and III
No. 19 Mk I	Green	2.5 sec.	37.6 in.	Cap and detonating composition, delay and instantaneous fuze, and gunpowder	G.P. 500-lb. Mks I, II, and III
No. 20 Mk I	Blue	15 sec.	37.6 in.	Cap and detonating composition, delay and instantaneous fuze, and gunpowder	G.P. 500-lb. Mks I, II, and III
No. 21 Mk I	Yellow	1 sec.	3.3 in.	Cap and detonating composition, delay fuze, and gunpowder	R.L. 112-lb. Mks VII and VIIC
No. 22 Mk I	White	None	13.5 in.	Cap and detonating composition, delay and instantaneous fuze, and gunpowder	G.P. 120-lb. Mks I and II G.P. 250-lb. Mks I, II, and III
No. 23 Mk I	Green	2.5 sec.	13.6 in.	Cap and detonating composition, delay and instantaneous fuze, and gunpowder	G.P. 120-lb. Mks I and II G.P. 250-lb. Mks I, II, and III
No. 24 Mk I	Blue	12 sec.	13.6 in.	Cap and detonating composition, delay and instantaneous fuze, and gunpowder	G.P. 120-lb. Mks I and II G.P. 250-lb. Mks I, II, and III
No. 25 Mk I	Yellow	1 sec.	13.6 in.	Cap and detonating composition, delay and instantaneous fuze, and gunpowder	G.P. 120-lb. Mks I and II G.P. 250-lb. Mks I, II, and III
No. 26 Mk I	Blue	12 sec.	37.6 in.	Cap and detonating composition, delay and instantaneous fuze, and gunpowder	G.P. 500-lb. Mks I, II, and III
No. 27 Mk I	Yellow	1 sec.	37.6 in.	Cap and detonating composition, delay and instantaneous fuze, and gunpowder	G.P. 500-lb. Mks I, II, and III
No. 30 Mk I	Blue	15 sec.	26 in.	Cap and detonating composition, delay and instantaneous fuze, and gunpowder	G.P. 250-lb. Mks I, II, and III
No. 31 Mk I	Yellow	1 sec.	26 in.	Cap and detonating composition, delay and instantaneous fuze, and gunpowder	G.P. 250-lb. Mks I, II, and III
No. 32 Mk I	Blue	12 sec.	26 in.	Cap and detonating composition, delay and instantaneous fuze, and gunpowder	G.P. 250-lb. Mks I, II, and III
No. 33 Mk I	White	None	26 in.	Cap and detonating composition, instantaneous fuze, and gunpowder	G.P. 250-lb. Mks I, II, and III

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ANVIL-TYPE DETONATORS

Anvil-Plug Class (Service)

Detonators	Color Code	Delay	Length	Filling	Bombs Used In
No. 35 Mk I	Blue	11 sec.	3.5 in.	Cap, delay, and exploder compositions, A.S.A. mixture, and gunpowder	S.A.P. 250- and 500-lb. Mk V G.P. 250-, 500-lb. Mk IV; 1,000-lb. Mks I-IV; 1,900-lb. Mks I and II; 5,000-lb. Mks I and II M.C. 250-lb. Mks I and II; 500-lb. Mks I-XII; 1,000-lb. Mks I and II; 4,000-lb. Mks I and II H.C. 2,000-lb. Mks II and III; 4,000-lb. Mks I-IV; 8,000-lb. Mks I and II; 12,000-lb. Mks I and II
No. 36 Mk I	White	None	3.5 in.	Cap and exploder compositions, A.S.A. mixture, and gunpowder	G.P. 40-lb. Mks I-III; 250-, 500-lb. Mk IV; 1,000-lb. Mks I-IV; 1,900-, 4,000-lb. Mks I-II M.C. 250-lb. Mks I and II; 500-lb. Mks I-XII; 1,000-, 4,000-lb. Mks I and II H.C. 2,000-lb. Mks II and III; 4,000-lb. Mks I-IV; 8,000-lb. Mks I and II; 12,000-lb. Mk II
No. 37 Mk I	Black	0.025 sec.	3.5 in.	Cap and exploder composition, A.S.A. mixture, and gunpowder	G.P. 40-lb Mk I
No. 43 Mk I	White	None	3.5 in.	Cap and detonating compositions	F. 20-lb. Mks I-III (Parachute); 20-lb. Mks I-III (Stabilized) G.P. 40-lb. Mks I-III (Parachute); 40-lb. Mks I-III (Stabilized); 250-, 500-lb. Mk IV; 1,000-lb. Mks I-IV; 1,900-, 4,000-lb. Mks I and II M.C. 250-lb. Mks I and II; 500-lb. Mks I-XII; 1,000-, 4,000-lb. Mks I and II H.C. 2,000-lb. Mks II and III; 4,000-lb. Mks I-IV; 8,000-lb. Mks I and II; 12,000-lb. Mk II
No. 44 Mk I	Yellow	1 sec.	3.5 in.	Cap, delay, and exploder compositions, A.S.A. mixture, and gunpowder	S.A.P. 250-, 500-lb. Mk V A.S. 100-, 250-, 500-lb. Mk IV G.P. 250-, 500-lb. Mk IV; 1,000-lb. Mks I-IV; 1,900-, 4,000-lb. Mks I and II M.C. 250-lb. Mks I and II; 500-lb. Mks I-XII; 1,000-, 4,000-lb. Mks I and II H.C. 2,000-lb. Mks II and III; 4,000-lb. Mks I-IV; 8,000-lb. Mks I and II; 12,000-lb. Mk II
No. 47 Mk I	Brown	0.12 sec.	3.5 in.	Cap, delay, and exploder compositions, A.S.A. mixture, and gunpowder	S.A.P. 250-, 500-lb. Mk V
No. 49 Mk I	Black	0.025 sec.	3.5 in.	Cap, delay, and exploder compositions, and A.S.A. mixture	G.P. 40-lb. Mks I-III; 250-, 500-lb. Mk IV; 1,000-lb. Mks I-IV; 1,900-, 4,000-lb. Mks I and II M.C. 250-lb. Mks I and II; 500-lb. Mks I-XII; 1,000-, 4,000-lb. Mks I and II H.C. 2,000-lb. Mks II and III; 4,000-lb. Mks I-IV; 8,000-lb. Mks I and II; 12,000-lb. Mk II

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Security Information

Part 3—ROCKETS

Chapter 1

INTRODUCTION

General

The development of rocket-type ammunition was begun by the British several years prior to the entrance of Great Britain into World War II. As early as 1936 experiments were begun in the field of rocketry. It was felt that, though experimentation should proceed in all types of rocket weapons, the development of a satisfactory antiaircraft weapon should be given the greatest emphasis. Antiaircraft rockets, though far less accurate than artillery, none the less were inexpensive to produce and could be manufactured in quantities sufficient to allow complete saturation of a defensive area.

Accordingly, in 1940 when the German "blitz" began, two antiaircraft rocket weapons were introduced into service use, the 2-in. U.P. (2-inch Unrotated Projectile) and the 3-in. U.P. These consisted of high-explosive heads fitted to a standard type, fin-stabilized rocket motor, and fuzed with impact or pyrotechnic delay aerial-burst fuzes.

Not much later, a novel type antiaircraft defense was developed in the "Wire Barrage" or "Aerial Mine Field" apparatus. This device was propelled or towed by a standard rocket motor. Its function was to suspend from a parachute a steel cable or a long length of piano wire with a small H.E. bomb attached. The apparatus served to break up an aircraft, if it struck the wire or cable, or to cause the aircraft to take evasive action and thus leave its target run. This type of apparatus was found to be particularly effective for defense of merchant ships against low-level or dive-bombing aircraft.

At about the same time, a 5-in. chemical rocket, the 5-in. U.P., was adopted for land service use. The rocket proved to have few profitable uses and was turned over to the British Navy. The Navy manufactured a high explosive, a smoke, and an incendiary shell for the rocket, mounted the launcher on a converted landing craft, and used it for beach barrage purposes, christening it the "Sea Mattress".

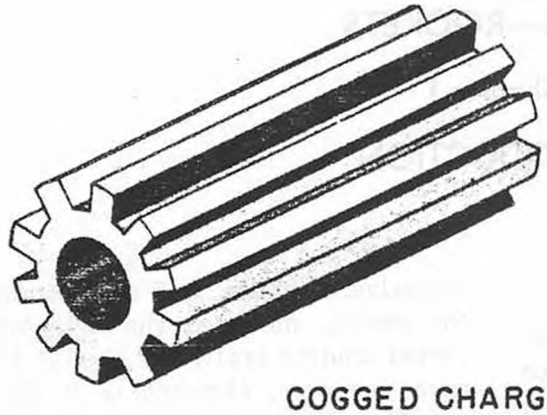
Developments in other fields of rocketry included aircraft rockets for attacks against armored vehicles, merchant shipping, and submarines. More recently an assault rocket for infantry use and a land barrage rocket, designed as a medium-range artillery support weapon, have been introduced.

Stabilization

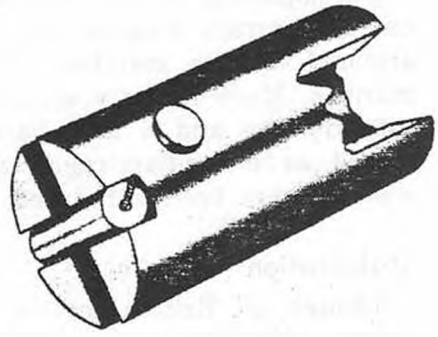
Though all British service rockets are designed solely for fin stabilization, more recent types incorporate fins of greatly reduced surface. To decrease the amount of dispersion caused by venturi variations, spiral rails have been fitted to the inside of the launcher barrel. The short fins engage these rails and impart a spin of about 800-900 r.p.m. to the rocket. However, this is not spin stabilization in the accepted sense of the term.

Propellant

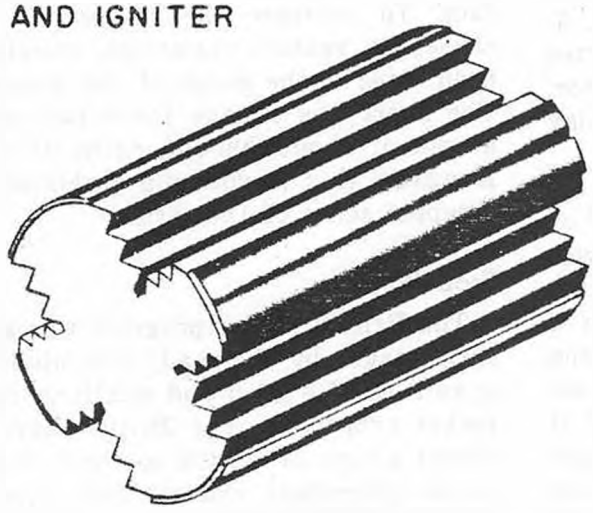
The British rocket program was aided in its early stages by the ready availability in large quantities of a good and relatively inexpensive rocket propellant. The British have long employed a type of cordite as their principal projectile propellant charge, and solventless extruded cordite proved remarkably adaptable to rocket use. Solventless cordite, identified by the code letters "S.U.", is a double-base powder consisting of 41.5% nitroglycerine, 49.5% nitrocellulose, and 9.0% carbamite, as a stabilizer. Flashless cordite is obtained by adding potassium cryolite. Flashless charges are identified by the symbol "/K." added to the propellant code letters.



COGGED CHARGE



TUBULAR CHARGE
AND IGNITER



CRUCIFORM CHARGE

Several different propellant shapes have been designed by the British, always in an attempt to gain the most efficient burning of the propellant. The charge shapes and identifying symbols are as follows:

Propellant Shape	Symbol
Tubular, drilled	/D.
Tubular, slotted	/S.
Tubular, slotted and grooved	/S.G.
Cruciform	/X.
Cogged	/C.

These code letters and symbols will be found stencilled on all rocket motors giving a complete description of the propellant grain used. Thus the letters "S.U./K./X." would indicate a cruciform grain of flashless solventless cordite; the letters "S.U./S.G.", a tubular grain of solventless cordite, slotted and grooved; etc.

The standard ignition mechanism for British rockets consists of an electric squib (Fuze, Electric, No. F. 53), inserted in a paper tube or metal cylinder, which also contains a quantity of igniting composition. The composition comprises magnesium, potassium nitrate, and a small amount of acaroid resin as a stabilizer. The igniter is generally fitted into castellations cut in the head of the propellant grain.

Nomenclature

British rocket nomenclature differs somewhat from that employed by U.S. forces. American and British equivalents follow.

American	British
Rocket motor	[1]Propelling tail
Body	Shell—with H.E., smoke, chemical, or incendiary filling
	Head—with flares, targets, etc.
	Shot—solid steel bodies
Nozzle	Venturi
Shroud	Drum
Tetryl	C.E.
Lead-dinitro-resorcinate	L.D.N.R.

[1]Note. Propelling tail is the original British nomenclature. It has been recently proposed by the British to revise their nomenclature, using the term rocket motor. Where applicable, the proposed new nomenclature has been included in the discussion of the individual rocket motors.

Complete Round Assemblies

A complete assembly will usually consist of a fuze, shell, a motor, and fins. Rockets employing separate shells generally employ a shell ring to join the shell and the motor. The shell ring consists of a cylindrical metal tube which fits inside the motor body and is held in place by a number of pins protruding from its wall. These pins are spring-loaded outward by a circular spring, and engage holes in the forward end of the motor body. The forward end of the shell ring is threaded to take the shell. Motors employing large tail fins usually employ separate fins for convenience in packaging for shipment. These fins are fitted with a double set of hooks, which engage slots in the after end of the motor body.

The following charts set forth the available information on complete round assemblies for the various types of British rockets. They include the designation of the assembly, and the designations of its various components, including both the old and the proposed new designations for the propelling tail unit, or rocket motor.

Note: For table of complete round assemblies, see pages 302-303.

COMPLETE ROUND

Rocket Assembly	Shell	Fuze
U.P. 2-in. Anti-aircraft Rocket	Shell, H.E., 2-in., Mks I and II	No. 720 Mk IV
	Shell, Smoke Trace, 2-in., Mk I	Thermal Initiator
2-in. Target Rocket	Head, Rocket Target, 2-in., Mk I	Pressure Armed Igniter
2-in. Flare Rocket	Head, Rocket Flare, 2-in., No. 1 Mk I	Ejector, Contents, No. 4 Mk I
	Head, Rocket Flare, 2-in., No. 1 Mk II	Ejector, Contents, No. 4 Mk II
	Head, Rocket Flare, 2-in., No. 2 Mk I	Ejector, Contents, No. 5 Mk I
	Head, Rocket Flare, 2-in., No. 3 Mk I	Ejector, Contents, No. 8 Mk I
U.P. 3-in. Anti-aircraft Rocket	Shell, H.E., 3-in., No. 1 Mk I	No. 700 Mks I-III, No. 730 Mk I, or No. 731 Mk I
	Shell, H.E., 3-in., No. 2, Mk I	No. 701 Mk I
3-in. Assault Rocket, "Lilo"	Shell, H.E., 3-in., No. 5 Mk I Shell, H.E., 3-in., No. 6 Mk I	No. 297 Mk I
3-in. Barrage Rocket "Land Mattress"	Shell, H.E., 29-lb., 3-in., Mk I	No. 721 Mk I (with spoilers), or No. 725 Mk I
3-in. Aircraft Rocket	Shell, H.E., 60-lb., F., 3-in., No. 1 Mk I/Air	No. 899 Mk I
	Shell, H.E., 60-lb., S.A.P., No. 1 Mk I (with delay)	No. 865 Mk I
	Shell, H.E., 60-lb., S.A.P., No. 2 Mk I (without delay)	No. 878 Mk I
	Shot, 25-lb., S.A.P., Mk I Shot, 25-lb., A.P., Mk I Shot, 25-lb., A.P., Mk II	None
3-in. Aircraft Rocket, Air-to-Air	Shell, H.E., 3-in., No. 2 Mk I	No. 720 Mk IV
3-in. Aircraft Rocket Flare	Head, Rocket Flare, A/C, 3-in., Mk I	Ejector, Contents, No. 7 Mk I
U.P. 5-in. Barrage Rocket "Sea Mattress"	Bomb, U., Smoke, 5-in., Mk I/L Bomb, U., Incendiary, 25-lb., 5-in., Mk I/L Shell, U., H.E., 29-lb., 5-in., Mk I/L	No. 721 Mks I-III
5-in. Cordtex Net Rocket	Cordtex Net (Obsolete)	
Antisubmarine Rocket Assembly	Depth Charge Mk XI	Depth Charge Pistols Mks XIV and XVI
Wire Barrage Rocket, Apparatus A.D. Type B Mk I	Head Canister, A.D. Type B (Containing Bomb, H.E., A.A.D. No. 2 Mk I)	Thermal Initiator Special Fuze
Wire Barrage Rocket, Apparatus A.D. Type J Mks I and II	Head Canister, A.D. Type J	Thermal Initiator
Wire Barrage Rocket, Apparatus A.D. Type L Mks I and II	Head Canister, A.D. Type L, Mks I and II (Containing Bomb, H.E., A.A.D., No. 8 Mk I)	Electric Squib and Safety Fuse Special Fuze

ASSEMBLIES

Propelling Tail or Rocket Motor		Propellant
Old Nomenclature	New Nomenclature	
Tail Propelling, U. 2-in., Mks I-III	Motor, Rocket, 2-in., No. 1 Mks I-III	SU/D
Propelling, Rocket Target, 2-in., Mks I and II	Motor, Rocket, 2-in., No. 4 Mks I and II	SU/C
Propelling Tail, Rocket Flare, 2-in., Mk VI and VII	Motor, Rocket, 2-in., No. 1 Mks VI and VII	SU or SU/K
Propelling Tail, U. 3-in., Mk I, or Propelling Tail, U. 3-in., Mk II	Motor, Rocket, 3-in., No. 1 Mk I, or Motor, Rocket, 3-in., No. 2 Mk I	SU, SU/D, SU/K, or SU/K/D
		SU/K/X
	Motor, Rocket, 3-in., No. 7 Mks I and II	SU/C or SU/K/C
Propelling Tail, Rocket, U. 3-in., Mks II and III		SU/X or SU/K/X
Motor, Rocket, A/C, 3-in., No. 1 Mks I and II	Motor, Rocket, A/C, 3-in., No. 1 MksI and II	SU or SU/K
Motor, Rocket, A/C, 3-in., No. 1 Mks II-IV		SU/X or SU/K/X
Motor, Rocket, A/C, 3-in., Mks I and II (Sunflower-Seed)		SU or SU/K
Motor, Rocket, A/C, 3-in., Mk I, Motor, Rocket, A/C, 3-in., No. 1 Mk I, or Motor, Rocket, A/C, 3-in., No. 1 Mks II-IV	Motor, Rocket, A/C, 3-in., No. 4 Mk I, Motor, Rocket, A/C, 3-in., No. 1 Mk I, or Motor, Rocket, A/C, 3-in., No. 5 Mks I-III	SU, SU/K, SU/X, or SU/K/X
Propelling Tail, Rocket, U. 5-in., No. 1 Mk 6/N		SU/SG
Motor, Rocket, 5-in., Cordtex Net, Mk I	Motor, Rocket, 5-in., No. 3 Mk I	SU or SU/K
	Motor, Rocket, 2-in., No. 5 Mk II	SU/K/CO 29
Special Motor		SU/K
Propelling Tail, U. 2-in., Mk IVA or Propelling Tail, U. 2-in., Mk VA	Motor, Rocket, 2-in., No. 2 Mk I, or Motor, Rocket, 2-in., No. 2 Mk II	SU or SU/K
Propelling Tail, U. 2-in., Mk IVB, or Propelling Tail, U. 2-in., Mk VB	Motor, Rocket, 2-in., No. 3 Mk I, or Motor, Rocket, 2-in., No. 3 Mk II	SU or SU/K

Part 3—Chapter 2

HIGH-EXPLOSIVE ROCKETS

Introduction

This chapter contains details of the various rocket assemblies, whose main purpose is to carry H.E.—charged shells. As a matter of convenience, several other types of shells, such as the smoke trace, S.A.P. shot, A.P. shot, etc., are discussed under the assembly with which they are used.

Figure 182—Assembled 2-in. U.P. Antiaircraft Rocket

The types of rockets dealt with include antiaircraft rockets, land and sea barrage rockets, aircraft-launched rockets, a demolition rocket, and an antisubmarine rocket assembly.

2-in. U. P. Antiaircraft Rocket (Service)

Data

Shells	H.E.	Smoke Trace
Over-all length	5.25 in.	5.5 in.
Diameter	2.25 in.	2.25 in.
Total weight	2.25 lb.	
Fuzes used	No. 720	Thermal Initiator
Filling	TNT	Smoke, P.N. 83 (M)
Filling weight	9 oz.	5.6 oz.

Rocket Motor

Over-all length	31 in. (approx.)
Diameter	2.25 in.
Width of fins	2.375 in.
Total weight	7.50 lb.
Propellant	Tubular cordite
Propellant weight	2.5 lb.
Burning time at 60° F.	0.9 sec.

General: This rocket is designed for shipboard use against aircraft in close-range attack. Because of the possible danger to adjacent craft resulting from spent rounds, the H.E. shell is fitted with a self-destroying fuze. The components of the complete round include a fuzed Shell, H.E., 2-in., Mks I or II or a Shell, Smoke Trace, 2-in., Mk I, and a Propelling Tail, U. 2-in., Mks I-III, complete with fin assembly.

Description

Shell H.E. 2-in., Mks I and II—This shell is a normal H.E. type, internally threaded at the nose to receive the fuze, and threaded externally at the base to screw into the shell ring of the rocket motor. The Shell Mk I, having 12 external threads per inch, will fit only the Mk I Motor. The Shell Mk II is machined with 14 threads per inch, and will fit all other motors.

The shell is painted buff over-all, with a ½-in. red band around the nose portion of the shell, and a ½-in. green band around the body. The initials of the filling are stencilled in black on the green band.

Shell, Smoke Trace, 2-in., Mk I—This shell consists of an H.E. Shell Body, Mk II, modified by drilling and tapping the base of the shell. A nose plug is threaded into the forward end of the shell and is centrally drilled to allow smoke emission. The drilled hole is closed by a thin metal disc and a cotton cambric disc. Upper and lower perforated tubes surrounded by primed cambric are separated from the nose plug by two millboard washers. The smoke filling is loaded around these tubes in two increments. Beneath the lower perforated tube is located a metal container filled with 7 grains of G.20 gunpowder.

The after end of the shell is closed by a threaded thermal septum of accurately machined thickness, in the center of which are pressed 2½ grains of L.D.N.R. The shell is painted light green over-all, with two ½-in. red bands painted around the body. Heat from the rocket motor initiates the L.D.N.R., firing the gunpowder charge and primed cambric, which initiates the smoke composition. The gunpowder explosion also blows the discs out of the nose plug of the shell.

Tail, Propelling, U. 2-in., Mks I-III—The motor consists of a welded steel cylinder, to the head of which a threaded shell ring is attached by means of spring-locked pins which engage holes in the motor body. A venturi tube is welded in the after end of the motor body. The tubular cordite grain is castellated at the forward end and rests in the motor body, supported by a metal grid at the after end. The propellant is initiated by an electric igniter placed in the castellations at the forward end. The tail orifice is sealed by a cardboard, plastic, or metal closing disc, and a silica gel bag is included as a moisture-proofing measure.

Electric leads from the igniter pass through the central channel of the cordite grain to the four brass contacts on the tail. These contacts, two positive and two negative, are so arranged that proper contact is maintained with the knife edges on the projector, regardless of the angle at which the round is loaded.

The motor is generally painted white or green over-all, with identification markings stencilled on the outside. Proposed new nomenclature for the motors is as follows: Motor, Rocket, 2-in., No. 1 Mks I-III.

Remarks: These rounds must not be fired outside of the temperature range of 0° and 120° F., unless filled with flashless cordite, which may be fired at temperatures between –5° and 130° F.

3-in. U.P. Antiaircraft Rocket (Service)

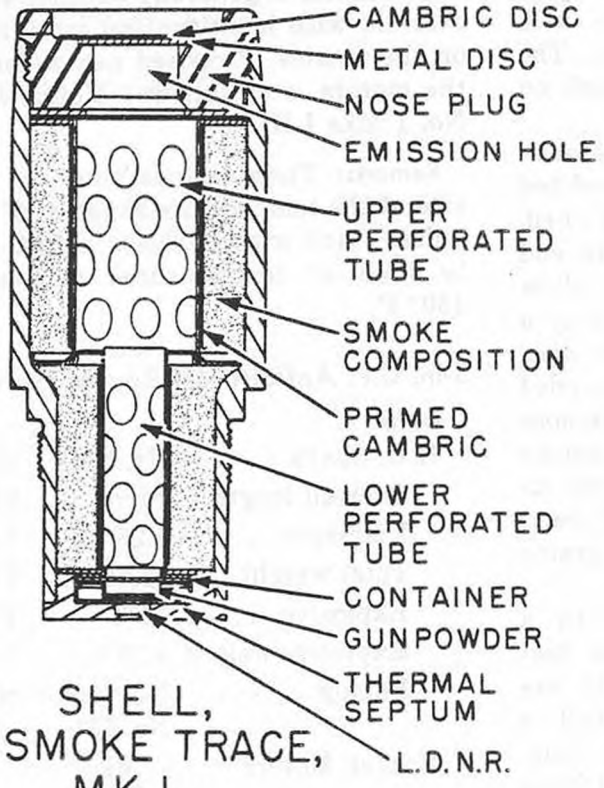
Data

H.E. Shells	No. 1 Mk I	No. 2 Mk I
Over-all length	14 in.	9.29 in.
Diameter	3.25 in.	3.25 in.
Total weight	17.75 lb.	7.6 lb.
Explosive	TNT	TNT
Explosive weight	4.28 lb.	2.125 lb.
Fuzing	No. 700 or No. 731	No. 701
Rocket Motors	**Mk I**	**Mk II**
Over-all length	55.19 in.	55.19 in.
Diameter	3.25 in.	3.25 in.
Width of fins	3.5 in.	3.5 in.
Total weight	31.2 lb.	31.5 lb.
Propellant	Tubular cordite	Cruciform cordite
Propellant wght.	12.7 lb.	13.0 lb.
Burning time	1.6 sec.	2.25 sec.

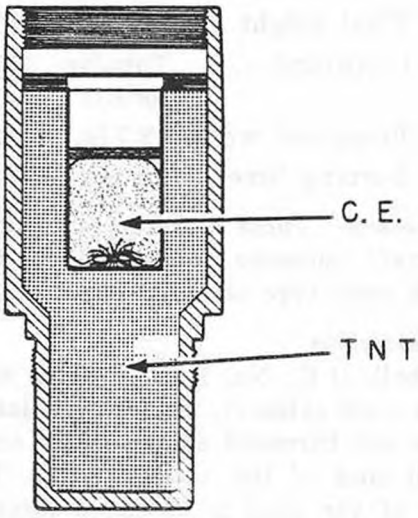
General: These rockets are designed for antiaircraft purposes, and thus are always fitted with some type of aerial-burst fuzing.

Description

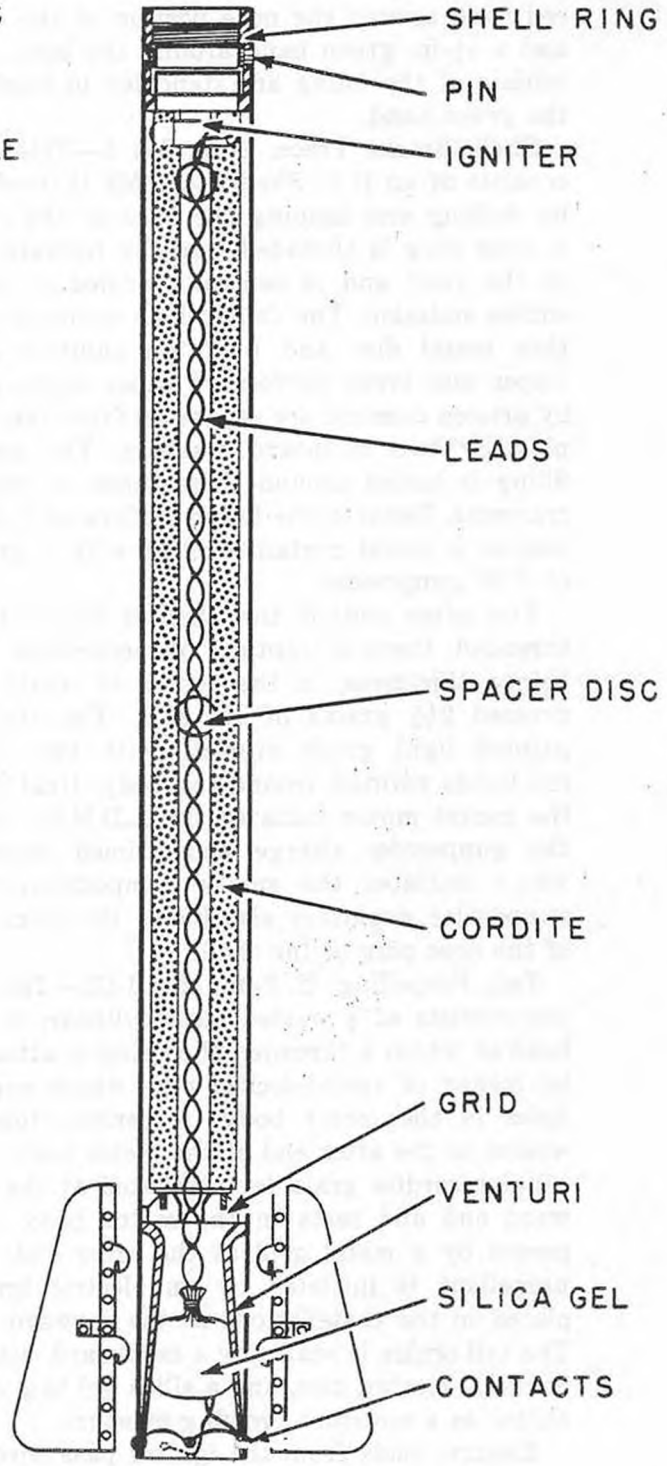
Shell, H.E., No. 1 Mk I—This shell consists of a steel cylinder, reduced in diameter at the base and threaded externally to screw into the shell ring of the rocket motor. The forward end of the shell is threaded internally to receive the base of the Fuze No. 731 or the adapter ring employed with the Fuze No. 700. Held in the nose fuze cavity by a locking ring is an exploder container with a booster charge, consisting of a 26-dram C.E. pellet and a 4-ounce TNT pellet, separated by a felt disc. A Gaine, or Booster, No. 13 Mk I is employed with fuzes used in this shell.



SHELL, SMOKE TRACE, MK I



SHELL, H.E., MK II



TAIL, PROPELLING, ROCKET, U. 2 IN. MKS II & III

Figure 183—2-in U.P. Antiaircraft Rocket Components

Shell, H.E., No. 2 Mk I—This shell consists of a light steel ogive struck with a 30-inch radius. The after part of the shell body is reduced in diameter and threaded externally to screw into the shell ring of the rocket motor. An internally threaded fuze adapter is welded to the forward end of the shell body. A cardboard exploder container is inserted into the main explosive filler beneath the fuze adapter and contains a 12-dram C.E. booster pellet.

Tail, Propelling, U. 3-in., Mks I and II—These motors are identical, except that the Mk I contains a tubular grain, while the Mk II grain is cruciform in shape. The motor body consists of a steel cylinder, slotted at the tail end to receive the four tail fins. A shell ring, fitted in the head end of the body, is internally threaded to receive the base of the shell, and has eight holes to correspond with those in the motor body. Locking pins, flanged on their inner ends, are inserted through these holes and are retained in position by two circular band springs. A copper- or cadmium-plated steel obturator is placed in the rear of the shell ring and is separated from the propellant grain by a cardboard disc and two cardboard washers.

The propellant grain is castellated at the forward end to receive the igniter, and a washer of dummy cordite, attached to the base of the grain, bears against the ring of the grid. Spacing discs and tabs are attached to the exterior of the cordite grain by a special cement.

The igniter consists of a 10-gram charge of magnesium with an electric squib enclosed in a paper tube. The insulated electric leads pass through the central channel of the cordite grain to the contacts at the after end of the motor body.

The tail obturator, positioned between the grid and the venturi tube, is made in the form of a steel cup with a central perforation. The steel venturi tube is attached to the motor body by screws and welding, and contains a small bag of silica gel as a moisture-proofing measure. The leads from the igniter are connected to the four contacts around the outside of the motor body, so positioned that they make contact with the knife edges on the launcher, regardless of the angle at which the rocket is loaded.

Figure 184—Assembled 3-in. U.P. Antiaircraft Rocket

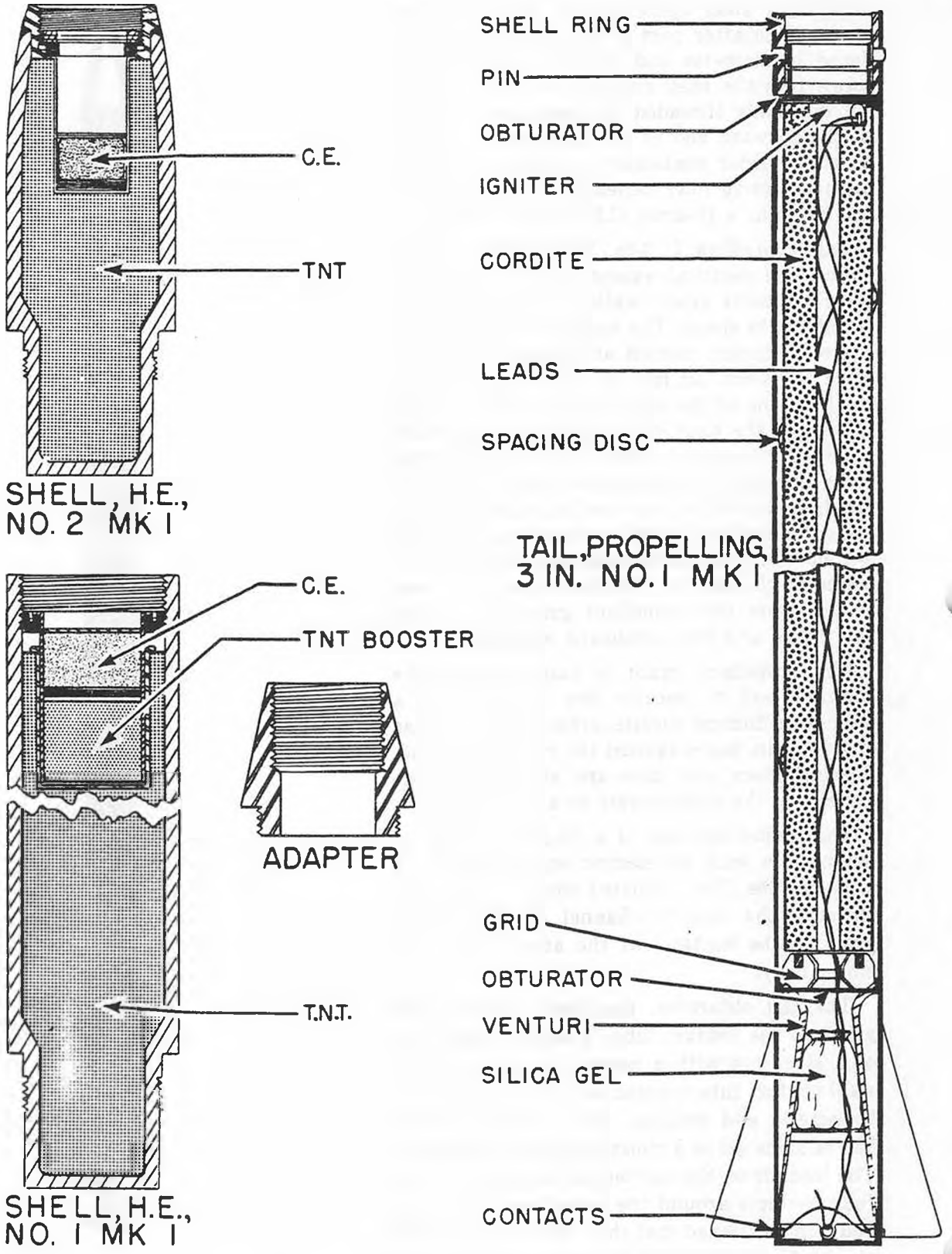


Figure 185—3-in. U.P. Antiaircraft Rocket Components

Though generally fin-stabilized, these rockets are sometimes fitted with narrow ¾-in. fins, stabilization being obtained by spiralling the rails on the inside of the launcher barrel.

Proposed new nomenclature for the rocket motors is as follows: Motor, Rocket, 3-in., No. 1 Mk I for Propelling Tail, Rocket, 3-in., Mk I, and Motor, Rocket, 3-in., No. 2 Mk I for Propelling Tail, Rocket, 3-in., Mk II.

Although originally designed for use in this assembly, the H.E. Shell No. 2 Mk I has never been so employed.

Remarks: The shells are painted buff over-all and carry a stencilled ring of red crosses ½-in. wide 1 in. behind the forward end of the shell body. A green band, upon which are stencilled in black the letters TNT, is located 4.5 in. behind the forward end of the shell. Complete identification, filling, and manufacturing information is stencilled in black on the shell body between these painted rings.

3-in. Assault Rocket, "Lilo" (Service)

Data

H.E. Shells	21 lb. No. 5	60 lb. No. 6
Over-all length	14.25 in.	17.50 in.
Diameter	3.25 in.	6.0 in.
Total weight	21 lb.	60 lb.
Fuzing	No. 297 Mk I	No. 297 Mk I
Filling	TNT	TNT
Filling weight	4 lb.	16.75 lb.

Rocket Motor

Over-all length	34.5 in.
Diameter	3.25 in.
Width of fins	1.75 in. (approx.)
Total weight	18.25 lb.
Propellant	Cog-shaped, cordite
Propellant weight	4.25 lb.
Burning time at 60°F.	0.5 sec.

General: This rocket is designed as a heavy offensive weapon for infantry use against lightly reinforced obstacles. Only small fins are provided on the rocket motor, so stabilization in flight has been achieved by incorporating spiral rails in the interior of the launcher body. The rocket is fired from a small portable launcher by means of a light dry-cell battery, a U.S. Army 10 cap exploder, or a U.S. Navy "Magnavox" firing key.

Figure 186—Assembled 3-in. Assault Rocket

Description

Shell, H.E., 21-lb., No. 5 Mk I—This shell consists of a steel cylinder closed at the forward end by a flat steel nose plug. The after end is externally threaded and reduced in diameter to screw into the shell ring of the rocket motor. A steel spigot is threaded into the after end of the shell body and contains the cordite-filled auxiliary charge container. Separated from the auxiliary cordite charge by a thin steel plate are a small thermal unit and a gunpowder pellet. Beneath this pellet the base percussion Fuze No. 297 Mk I is threaded directly into the shell body. A single C.E. exploder pellet is located beneath the fuze in a cardboard exploder container.

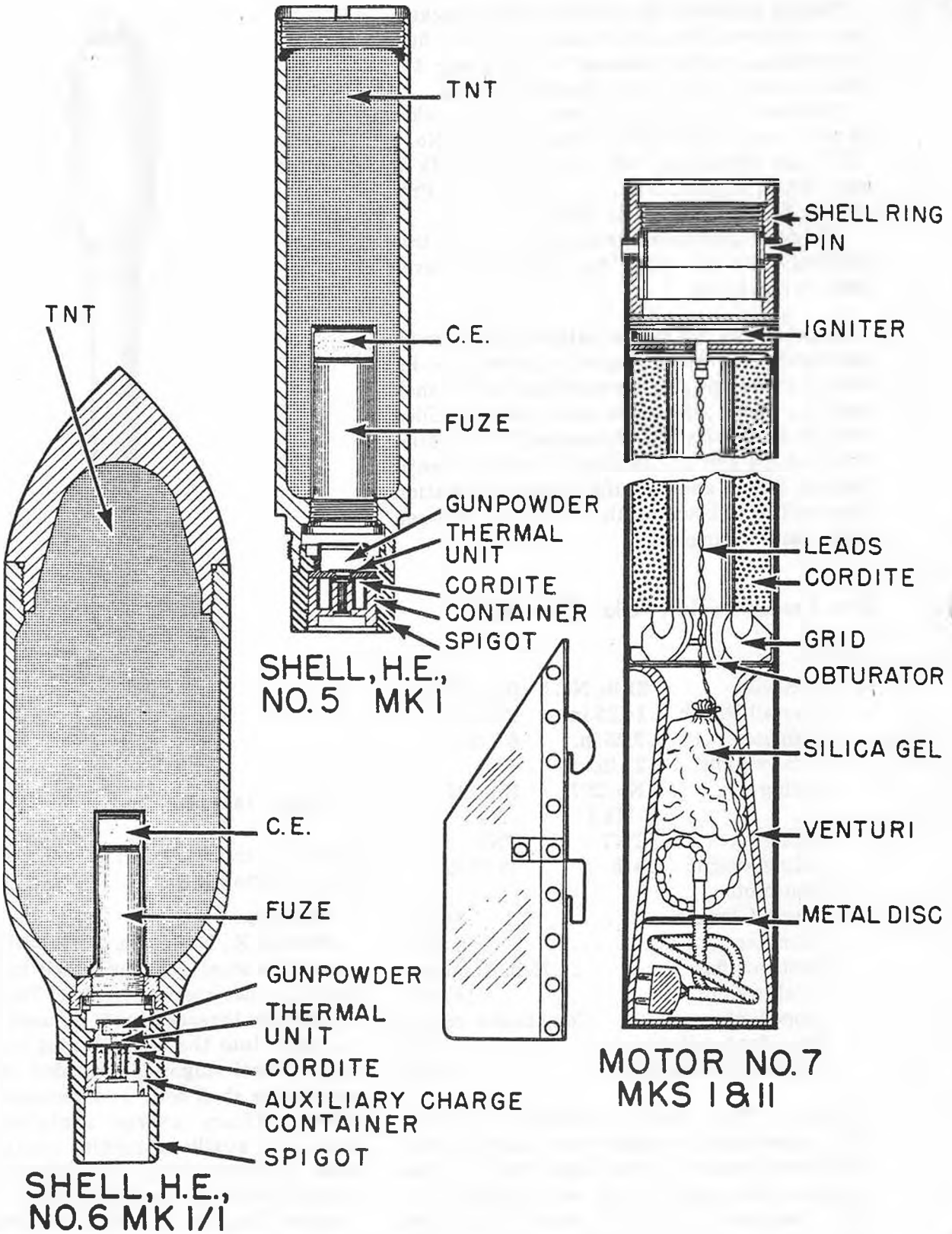


Figure 187—3-in. Assault Rocket Components

Shell, H.E., 60-lb., No. 6 Mk I—The 60-lb. shell contains a Fuze No. 297 and an auxiliary charge container almost identical to that incorporated in the 21-lb. shell. A slightly different spigot arrangement is employed, however, as the spigot itself is externally threaded for attachment to the shell ring of the rocket motor. The nose portion of the shell is ogival and threads into the cylindrical shell body portion.

Motor, Rocket, 3-in., No. 7 Mks I and II—The motor consists of a steel tube fitted with a shell ring at one end and at the other with a venturi tube. The threaded shell ring is held in position by eight locking pins engaged by a circular band spring.

The venturi is welded to the inside of the motor body. A steel grid, separated from the venturi tube by the tail obturator, supports the cog-shaped cordite propellant grain. A metal closing disc in the venturi tube supports the igniter leads, which terminate in a two-pronged plug. The after end of the venturi is sealed by a cardboard closing disc. The igniter leads extend from the plug through the central annulus of the propellant grain to the metal igniter housing, which contains a small electric squib surrounded by a charge of gunpowder. Behind the metal closing disc in the venturi is located a bag of silica gel as a moisture-proofing measure.

The four fins are assembled to the motor by engaging their hooks in the fin slots in the after end of the motor body and pressing home the locking catches on the fins. A 10-yard extension cable is provided with each motor for firing purposes, thus allowing personnel to take cover when firing occurs. The extension is plugged at one end and contains a two-hole socket at the other for attachment to the plug connected to the igniter leads of the motor.

The motor must not be fired outside the temperature range of —5° to 135° F.

Remarks: The shells are painted buff over-all, with a ½-in. red band around the nose and a 1-in. light green band around the body. On this latter band are stencilled in black the letters of the explosive filling. Two thin white bands are painted around the body on either side of the light green band.

3-in. Barrage Rocket, "Land Mattress" (Service)

Data

H.E. Shell

Over-all length	14.75 in.
Diameter	5.0 in.
Total weight	34.25 lb.
Fuzing	No. 721 Mks II* and III, and No. 725 Mk I
Filling	Amatol 60/40 or 50/50

Rocket Motor

Over-all length	55.19 in.
Diameter	3.25 in.
Width of fins	0.75 in. (approx.)
Total weight	30 lb.
Propellant	Cruciform cordite
Weight of propellant	11.5 lb.
Burning time at 60° F.	1.5 seconds

General: The Land Mattress rocket is designed as a barrage rocket for land service use. The motor employed is an adaptation of a 3-in. aircraft rocket motor, the modification consisting of cutting down the tail fins. Loss of stabilization due to the reduced tail surfaces is regained by imparting a spin to the rocket with spiral rails in the barrel of the launcher.

Description

Shell, H.E., 29-lb., 3-in., Mk I—This shell is a modification of the 29-lb. H.E. shell used with the 5-in. barrage rocket. The modifications consist of a threaded adapter screwed to the spigot on the base plate of the shell. The adapter is externally threaded to screw into the shell ring of the 3-inch rocket motor. Further modification of the shell includes alteration of the exploder pocket to receive the larger booster assembly of the Fuze No. 721. The shell is painted buff over-all, with a ½-in. red band painted around the nose portion of the shell and a 1-in. green band painted around the shell body. On this band the initials of the type of filling used are stencilled in black.

Motor, Rocket, A/C, 3-in., No. 1 Mk III—This motor is identical to the Motor No. 1 Mk II, except that a single-pronged plug has been substituted for the two-pin plug on the end of the igniter leads. The motor, when used with the Land Mattress rocket, employs tail fins of a reduced width instead of the standard 5-in. fins.

Figure 188—Assembled 3-in. Barrage Rocket

Remarks: A novel method of varying range is incorporated in this rocket. Two spoiler plates, which consist of metal discs with three equi-spaced, cut-out segments, are placed face to face and are fitted to a spoiler bush. The spoiler bush is a collar which fits over the top of the Fuze No. 721 and is recessed so as not to foul the protruding ends of the fuze shear wire. The bush engages with the top cannelure of the fuze and is held attached to the fuze by a locking wire around the fuze body. The spoiler plates are secured to the spoiler by a spring steel circlip, which engages a groove in the bush just above the spoiler plates. Four small holes are drilled in one segment of each plate. Range variations are obtained by varying the relative positions of the spoiler plates to give different areas of wind resistance. The setting given to the spoiler plates is maintained by passing a special locking pin through the aligned holes in the plates.

Three different sizes of spoiler plates may be used, the smallest of which is painted red on one side, the medium size, blue, and the largest, white.

3-in. Aircraft Rocket (Service)

Data

H.E. Shells:	60 lb. F.	60 lb. S.A.P.
Over-all length	22.0 in.	21.8 in.
Diameter	4.5 in.	6.0 in.
Total weight	46.9 lb.	60.0 lb.
Fuzing	No. 899 Mk I	No. 865 [illegible] I, or No. 878 Mk I
Filling	TNT or RDX TNT 60/40	TNT or Amatol 60/40
Filling weight	3.9 lb.	12.0 lb.
Solid Shot	25 lb. A.P. and S.A.P. Mk I	25 lb. A.P. Mk II .
Over-all length	12.4 in.	14.7 in.
Diameter	3.44 in.	3.8 in.
Total weight	25.0 lb.	24.75 lb.

Rocket Motor:

Over-all length	55.19 in.
Diameter	3.25 in.
Width of fins	5 in.
Total weight	35.1 lb.
Burning time at 60° F.	1.5 seconds
Propellant	Mk I, tubular cordite; Mks II and III, cruciform cordite
Propellant weight	Mk I, 12.6 lb.; Mks II and III, 11.3 lb.

General: This is an aircraft rocket weapon designed primarily for use against submarines and merchant shipping, although more recently

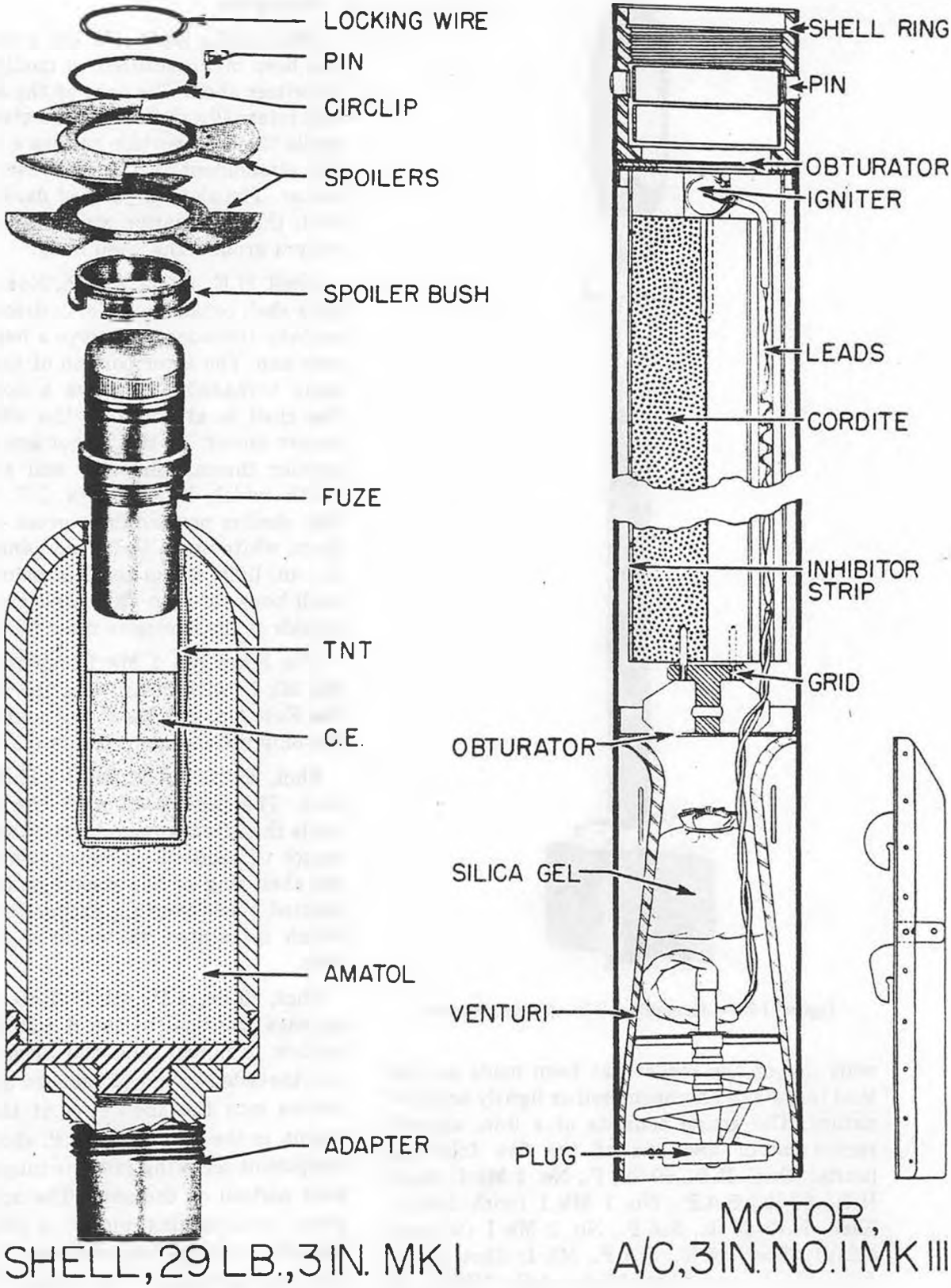


Figure 189—3-in. Barrage Rocket Components

Figure 190—Assembled 3-in. Aircraft Rocket

wide use of the rocket has been made against land targets of an unarmored or lightly armored nature. The round consists of a 3-in. aircraft rocket motor and one of the five following heads: Shell, H.E., 60-lb., F., No. 1 Mk I; Shell, H.E., 60-lb., S.A.P., No. 1 Mk I (with delay); Shell, H.E. 60-lb., S.A.P., No. 2 Mk I (without delay); Shot, 25-lb., S.A.P., Mk I; Shot, 25-lb., A.P., Mk I; and Shot, 25-lb., A.P., Mk II. In addition, two concrete practice heads are also used, one weighing 25 lb., the other 60 lb.

Description

Shell, H.E., 60-lb., F., No. 1 Mk I—This shell has been manufactured by modifying a 4.5-inch Howitzer shell. The nose of the shell is recessed and internally threaded to receive the nose fuze, while the base portion carries a threaded spigot for attachment to the shell ring of the rocket motor. The shell is painted dark green over-all, with the designation stencilled in ½-in. yellow letters around the shell body.

Shell, H.E., 60-lb., S.A.P., Nos. 1 and 2 Mk I—This shell consists of a cylindrical steel body internally threaded to receive a heavy steel ogival nose cap. The after portion of the body is internally threaded to receive a spigot, by which the shell is attached to the shell ring of the rocket motor. In the spigot are carried a gunpowder thermal initiator and a base fuze, beneath which is located a C.E. booster pellet. The shell is painted dark green over-all, with a ½-in. white and a ½-in. red band near the nose. A 1-in. light green band is painted around the shell body, and on this band are stencilled the initials of the explosive main filling.

The Head No. 1 Mk I employs the Fuze No. 865 Mk I (with delay) and the No. 2 Mk I uses the Fuze No. 878 Mk I (without delay). This is the only difference in the two shells.

Shot, 25-lb., S.A.P., Mk I—This is a solid steel shot. The nose portion of the shot is ogival, while the after portion terminates in a threaded spigot of reduced diameter, which screws into the shell ring of the rocket motor. The shot is painted black over-all, except for the nose end, which is painted white for a distance of one inch.

Shot, 25-lb., A.P., Mk I—Externally this shot appears identical to the S.A.P. shot. The nose portion is ogival, and the after body consists of a threaded spigot of reduced diameter, which screws into the shell ring of the motor. This spigot, in the case of the A.P. shot, is a separate component screwing into the internally threaded base portion of the shot. The spigot is held in place by a locking pin or a set-screw, which pierces the spigot and engages the shell body. The shot is painted black over-all, but carries ½-in. white band in addition to the 1-in. white tip on the nose.

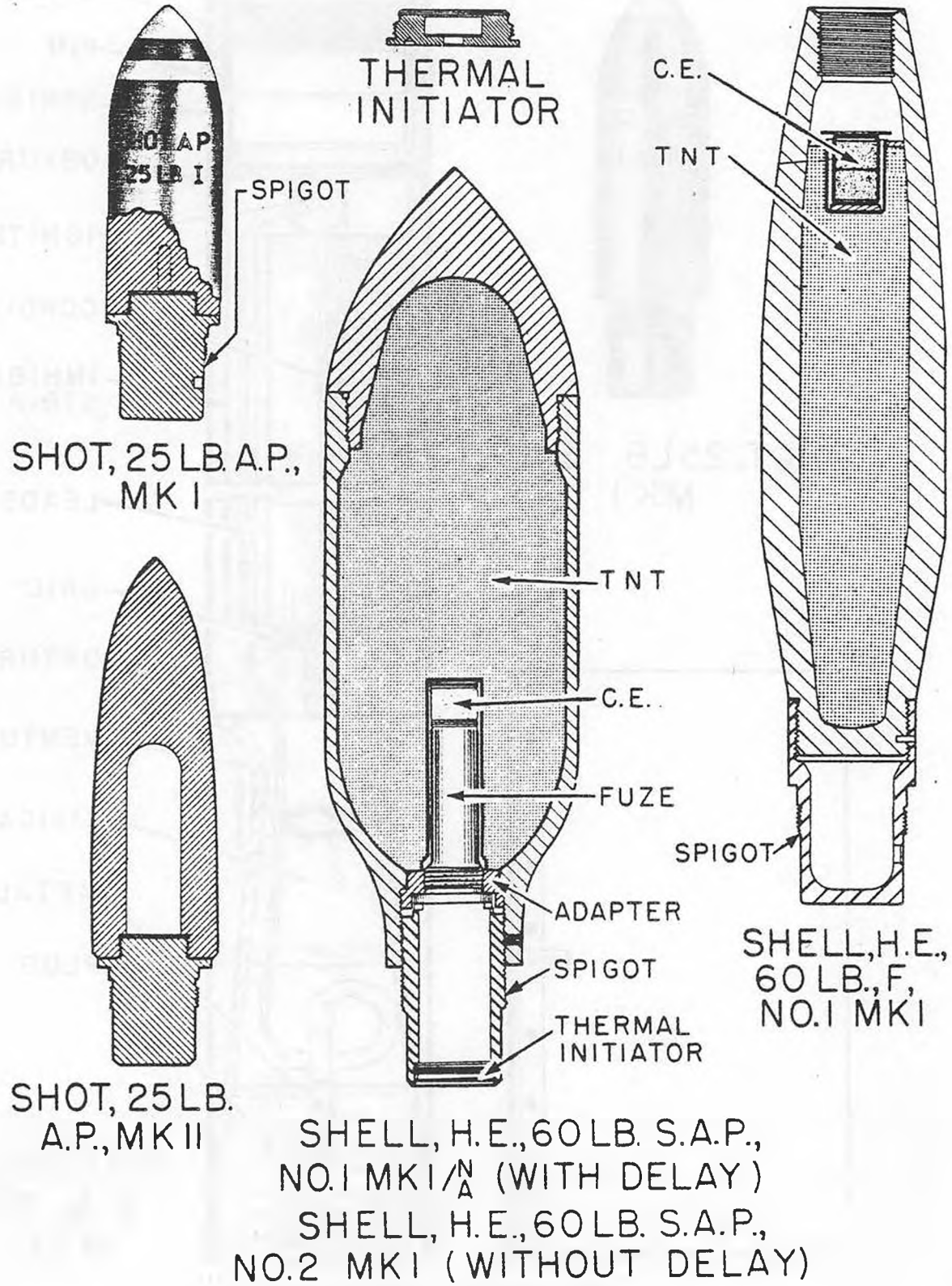
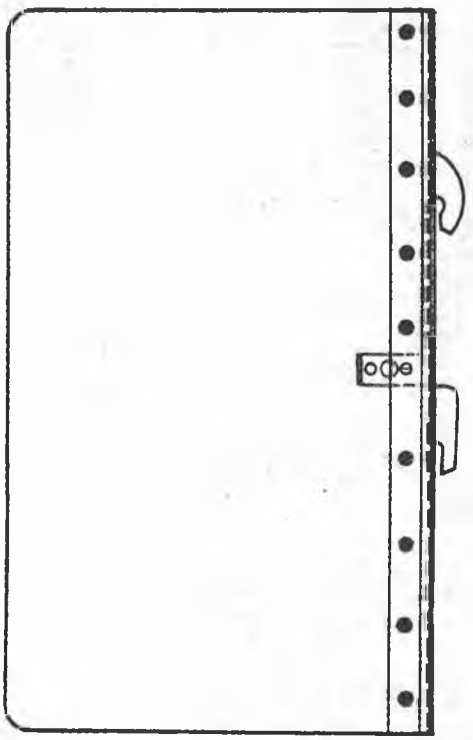
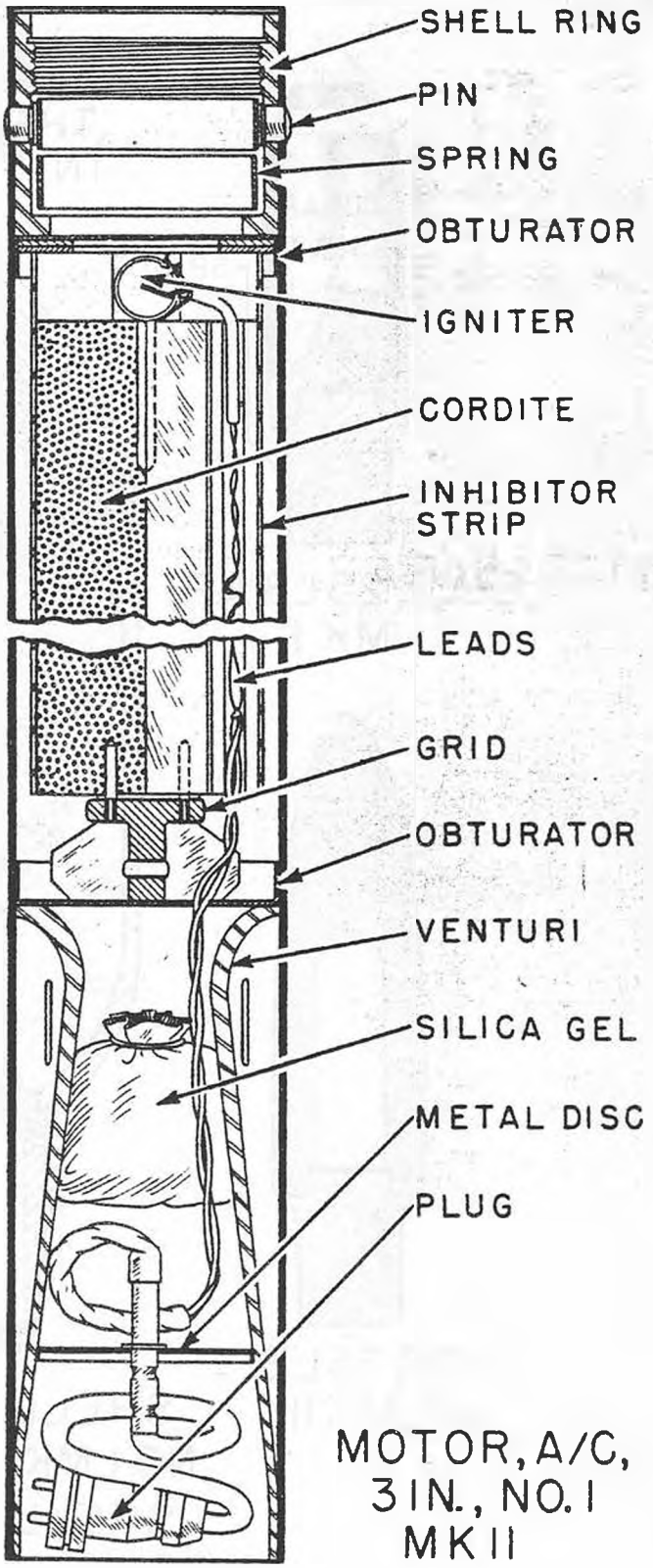


Figure 191—3-in. Aircraft Rocket Components

SHOT, 25 LB. S.A.P., MK I





MOTOR, A/C, 3 IN., NO. I MK II

Figure 192—3-in. Aircraft Rocket Components

Shot, 25-lb., A.P., Mk II—This shot consists of a solid steel body machined externally to form a double ogive. This contour is considered to result in greater penetration and better underwater ballistics. Penetration is also enhanced by heat-treating the body of the shot. The after end of the body is recessed to form an empty cavity, and the base of this cavity is closed by a threaded spigot which screws into the shell ring of the rocket motor. The shot is painted black over-all, with a 1-in. white tip and a ½-in. white band on the nose.

Shell, 60-lb., Practice (Concrete), Mk I—This is a blunt-nosed cylindrical head consisting of an adapter, externally threaded to screw into the shell ring of the motor and fitted with eight steel reinforcing rods, welded into place. The concrete is then formed around the reinforcing rods and shaped to measure 20 inches over-all and 6 inches in diameter.

Shell, 25-lb., Practice (Concrete), Mk I—This shell is manufactured in an identical manner to the 60-lb. Practice Shell, but measures only 11.5 inches in length and 5 inches in diameter.

Motor, Rocket, A/C, 3-in., No. 1 Mk I—This motor consists of a long steel cylinder with a shell ring at the forward end held in place by eight locking pins, which are held in engagement by two circular band springs. A thin metal-headed obturator is located beneath the shell ring and is separated by cardboard washers from the forward end of the propellant grain. The head of the grain is castellated to accommodate the Igniter, Fuze, Electric, No. 53*. The base of the propellant grain is supported by a metal grid, which in turn rests against the tail obturator. The steel venturi tube is welded to the inside of the motor just behind the tail obturator and contains a bag of silica gel as a moisture-proofing measure.

The igniter leads extend from the igniter through the central annulus of the tubular cordite grain, along the outside groove of the cruciform grain in the Motors No. 1 Mks II and III, through the tail obturator and venturi, and through the metal closing plate, and terminates in a two-pronged plug. This plug connects with a socket extension on the rail launcher, when the rocket is loaded aboard the plane.

Eight slots are located in the motor body near the after end for attachment of the four fins. The rockets are suspended by two saddles, each carrying a T-lug, which rides in the grooves of the launcher rails.

Motor, Rocket, A/C, 3-in. No. 1 Mk II—This motor differs from the No. 1 Mk I in that the propellant grain is cruciform in shape rather than tubular. The igniter leads are brought along the outside grooves of the grain, rather than through a central annulus, and a different type grid is employed. Proposed new nomenclature for the Motor No. 1 Mk II is: Motor, Rocket, A/C, 3-in., No. 5 Mk I.

Motor, Rocket, A/C, 3-in., No. 1 Mk III—The main difference between the Motors Mk II and Mk III is that the Mk III has a weak link pigtail as against a niphon plug in the Mk II motor. The proposed new nomenclature for this motor is Motor, Rocket, A/C, 3-in., No. 5 Mk II.

Motor, Rocket, A/C, 3-in., No. 1 Mk IV—This motor differs from the No. 1 Mk III in that a small metal clip is loosely inserted over the igniter leads between the niphon plug and the attachment to the metal closing disc. The Motor Mk IV also has a longer pigtail lead; this greater length of lead being required for the lower round when using the "tier carriage" scheme. The proposed new nomenclature for this motor is Motor, Rocket, A/C, 3-in., No. 5 Mk III.

Remarks: These motors are colored either green or white over-all, with identification stencillings in yellow.

3-in. Aircraft Rocket, Air-to-Air (Soon in Service)

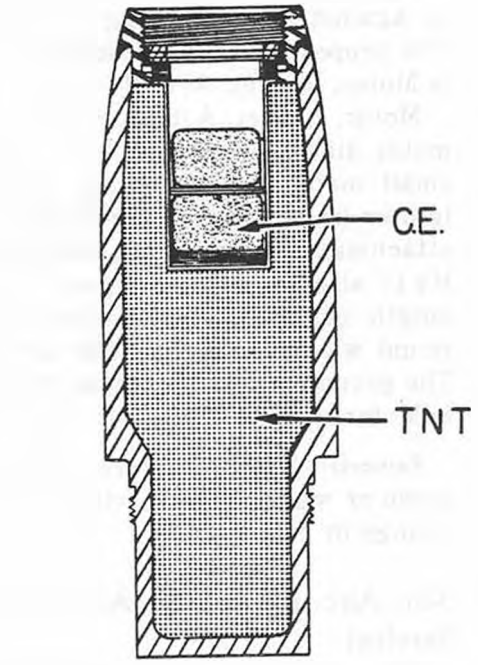
Data

H.E. Shell

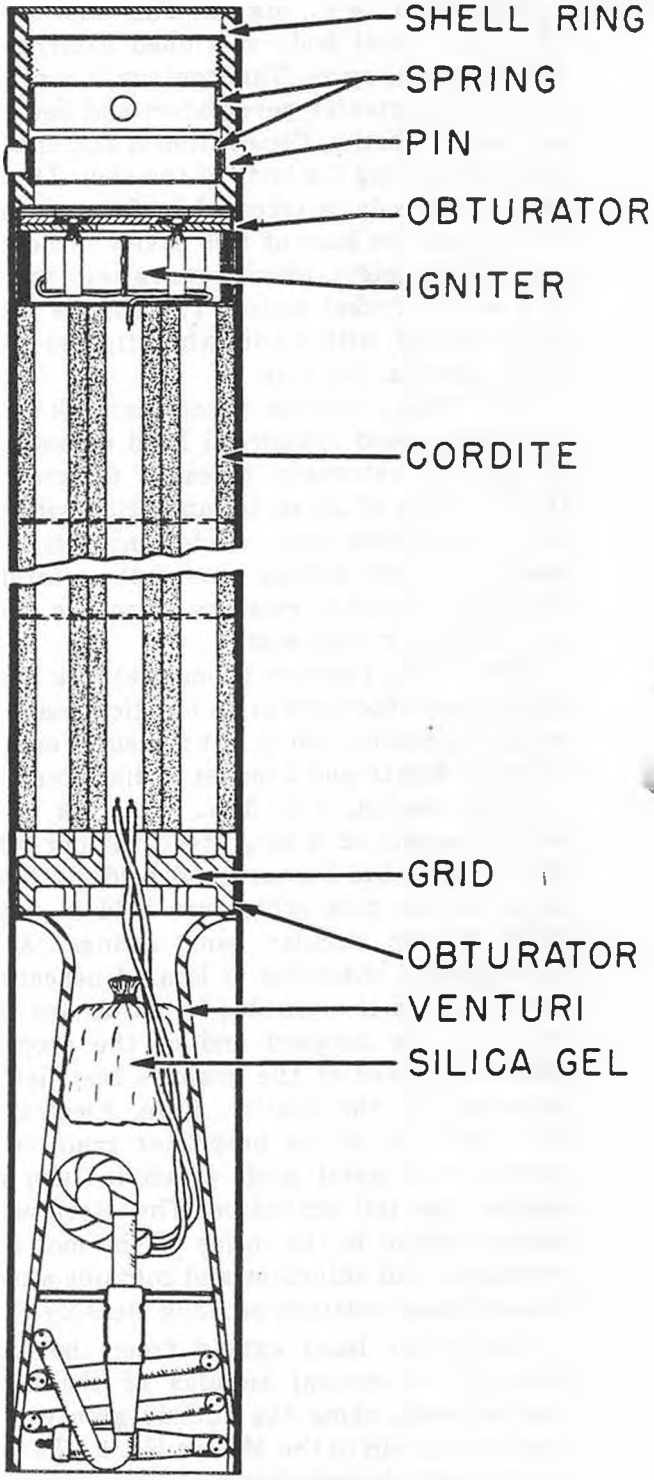
Over-all length	9.29 in.
Diameter	3.25 in.
Total weight	7.6 in.
Filling	TNT
Filling weight	2.125 lb.
Fuzing	No. 720 Mk IV

Rocket Motor

Over-all length	31 in.
Diameter	3.25 in.
Width of fins	0.75 in.
Total weight	19 lb. (approx.)
Propellant	7 grains of tubular cordite
Propellant weight	4.2 lb.
Burning time at 40° F.	0.3 sec.



SHELL, H.E., 3",
NO. 2 MK I



"SUNFLOWER SEED"
MOTOR MK II

Figure 193—3-in. Aircraft Rocket (Air-to-Air) Components

General: This rocket was designed for upward vertical firing from heavy bomber aircraft to disrupt attacking formations of enemy fighters. The rocket head is fitted with a self-destroying fuze so that misses will not fall on friendly aircraft or territory after expiration of the rocket motor. The round consists of a 3-in. light ogival Shell No. 2 Mk I fitted with a Fuze No. 720 Mk IV, and a Motor, Rocket, A/C, 3-in., Mks I and II "Sunflower Seed."

Description

Shell, H.E., 3-in., No. 2 Mk I—This shell was originally designed for use with the 3-in. antiaircraft rocket and the Fuze No. 701, but has been slightly modified for use with this rocket weapon. The shell consists of a light steel ogive struck with a 30-inch radius. The after part of the shell body is reduced in diameter and is threaded externally to screw into the shell ring of the rocket motor. An internally threaded fuze adapter is welded into the forward end of the shell body. A cardboard exploder container is inserted into the main explosive filling beneath the fuze adapter and contains two 12-dram C.E. booster pellets.

The shell is painted buff over-all and carries a stencilled ring of red crosses ½-in. wide and one inch below the forward end of the shell body. A green band, upon which are stencilled the black letters TNT, is located 4.5 in. below the forward end of the shell. Complete identification, filling, and manufacturing information is stencilled in black on the shell body between these two rings.

Motor, Rocket, A/C, 3-in. Mks I and II "Sunflower Seed"—The rocket motor is a standard 3-in. proof motor reduced in length to 31 in. by elimination of a cardboard spacer sleeve. The motor consists of a cylindrical steel body, fitted at the head end with a shell ring, which is held in place by eight spring-locked pins. A head obturator is located behind the shell ring. The propellant consists of seven tubular grains of flashless cordite, each grain measuring 1 in. in diameter by 18 in. in length. The igniter leads pass from the igniter along the outside of the grains and end in a two-pronged niphon plug. A tail obturator is located aft of the propellant grains, and a venturi is located in the base of the motor. A small bag of silica gel is placed in the venturi as a moisture-proofing measure.

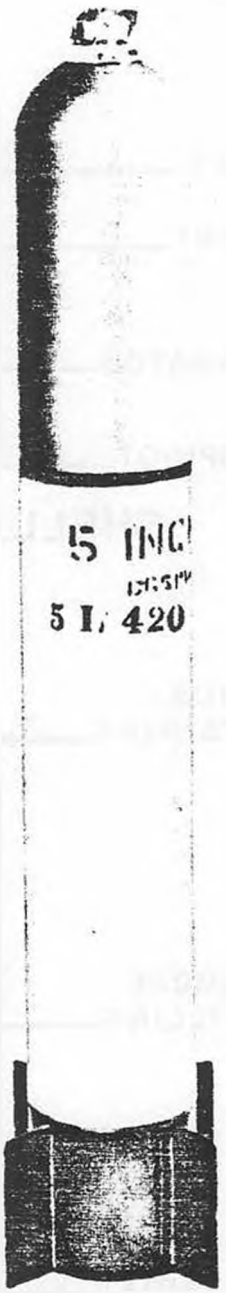


Figure 194—Assembled 5-in. Barrage Rocket

5-in. Barrage Rocket, "Sea Mattress" (Service)

Data

H.E. Shell:	H.E. Mk I/L
Over-all length	11.6 in.
Diameter	5.0 in.
Total weight	29 lb.
Fuzing	No. 722 Mk III

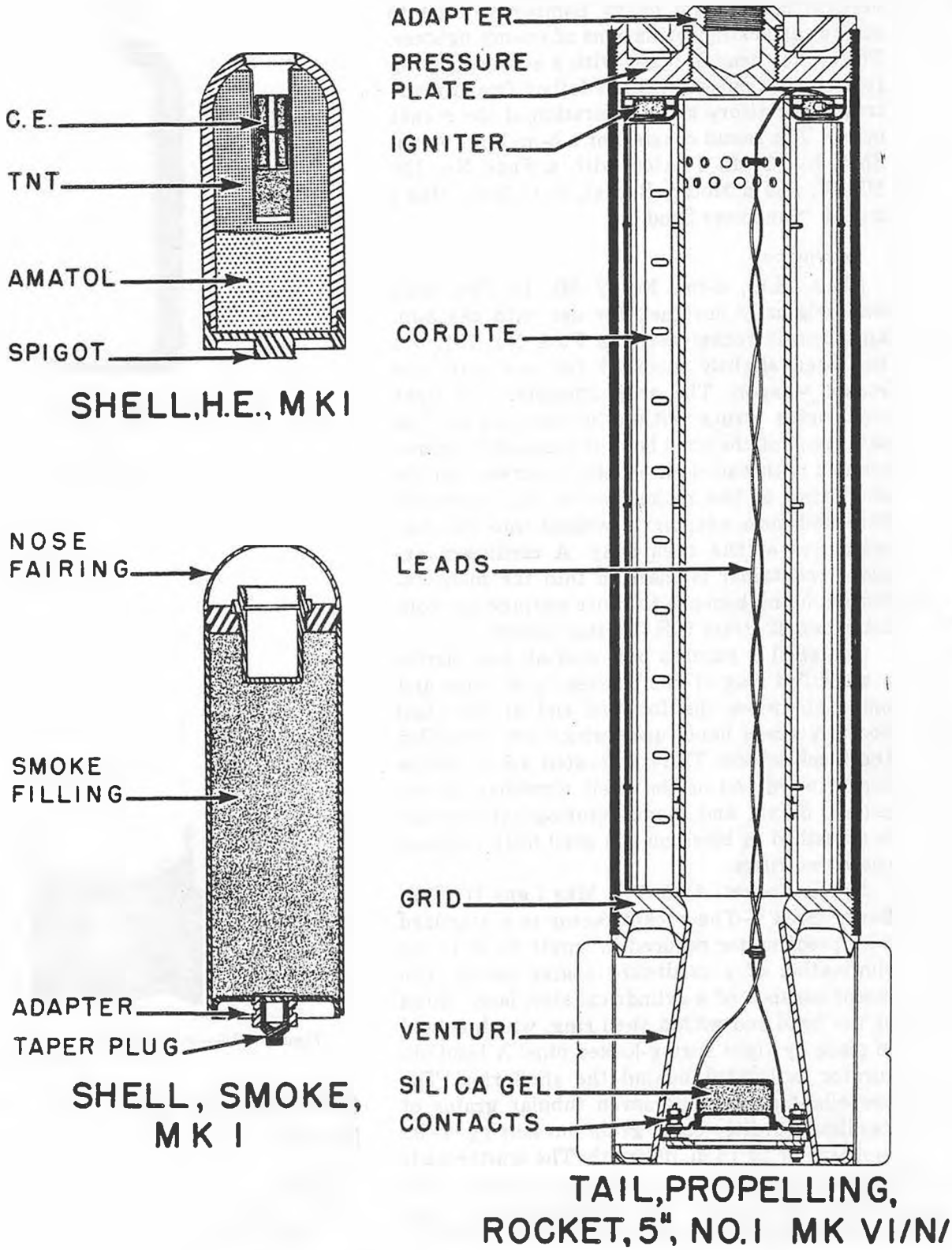


Figure 195—5-in. Barrage Rocket Components

Data (continued)

Filling .....Amatol (60/40 or 50/50) or Amatol and TNT

Chemical Shells:	Smoke Mk I/L	Incendiary Mk I/L
Over-all length	19.7 in.	19.7 in.
Diameter	5.0 in.	5.0 in.
Total weight	29 lb.	25 lb.
Fuzing	No. 721 Mks I-III	No. 721 Mks I-III
Filling	C.S.A., F.M., or W.P.	Perspex Benzole Gel

Rocket Motor:

Over-all length .....25.75 in.
Diameter .....5.0 in.
Total weight .....29.0 lb.
Propellant ....11 grains of tubular cordite
Propellant weight .....5.5 lb. (approx.)
Width of fins .....1.9 in.
Burning time at 60° F. .....0.35 sec.

General: These rockets are intended primarily for beach barrage from landing craft. The incendiary bomb is employed only for ranging purposes, providing a visual indication of the attainment of the proper range. A changeover is then made to H.E., or smoke. The complete round consists of H.E. Bomb, and Propelling Tail, Rocket, 5-in., No. 1 Mk VI/N; Incendiary Bomb, and Propelling Tail, Rocket, 5-in., No. 1 Mk VI/N; or Smoke Bomb, and Propelling Tail, U. 5-in., Mk III/N.

Description

Bomb, H.E., 29-lb., 5-in., Mk I/L—This shell consists of a thin-walled steel forging, closed at the after end by an externally threaded base plate. The base plate carries a threaded spigot which screws into the shell adapter of the rocket motor. Set into the explosive filling at the nose end of the shell is an exploder container with two perforated and one solid C.E. booster pellets. The shell may be alternatively filled with Amatol or an upper layer of TNT and a lower layer of Amatol. If the former filling is employed, a TNT surround is located around the exploder container. The shell is painted buff over-all.

Bombs, Smoke, and Incendiary, 5-in., Mk I/L—These shells are of identical construction, differing only in the nature of the filling. The shell body consists of a metal cylinder welded to a closing plate at the nose end and to a tail plate at the rear. The closing plate is internally threaded to receive the fuze adapter, and a spigot is welded into the central opening in the base plate. This spigot is externally threaded to screw into the rocket motor and threaded internally to receive a tapered filling plug. For better ballistic qualities, a sheel steel nose fairing is fitted over the nose fuze, which protrudes through a central opening in the fairing. The fairing is held in place by a metal circlip around the outside of the fuze body.

Tail, Propelling, Rocket, 5-in., No. 1 Mk VI/N—This motor consists of a cylindrical steel body, the forward end of which is closed by a cast-iron pressure plate and a transit plug. Within the after end is a cast-iron venturi tube, closed by a closure plate to which are attached the automatic contact leads. A drum and four fins are attached to the after end of the motor for stabilization.

Ignition of the cordite propellant is achieved by a magnesium igniter fitted at the forward end of the cordite grains. The igniter is fired by an electric squib, Fuze, Electric, No. F. 53 Mk I, whose leads pass to two sockets fitted to, but insulated from, the venturi closing plate. An automatic contact disc is fitted to the outer side of the closure plate, two leads from which are fitted to two sockets in the closure plate. The automatic contact disc connects one of the igniter leads to the "ground", in this case the motor body. The central brass disc of the automatic contact disc makes contact with an insulated spring finger on the projector.

These rocket motors must not be fired outside of the temperature range of 0 to 120° F. Moisture-proofing is effected by a silica gel capsule fitted into the after end of the venturi tube.

5-in. Cordtex Net Rocket (Service)

Data

Rocket Motor

Over-all length .....18.25 in.
Maximum body diameter .....4.75 in.
Propellant .....Tubular cordite

General: This motor was originally used to tow a specialy constructed net of Cordtex (Primacord), used for demolition purposes. The

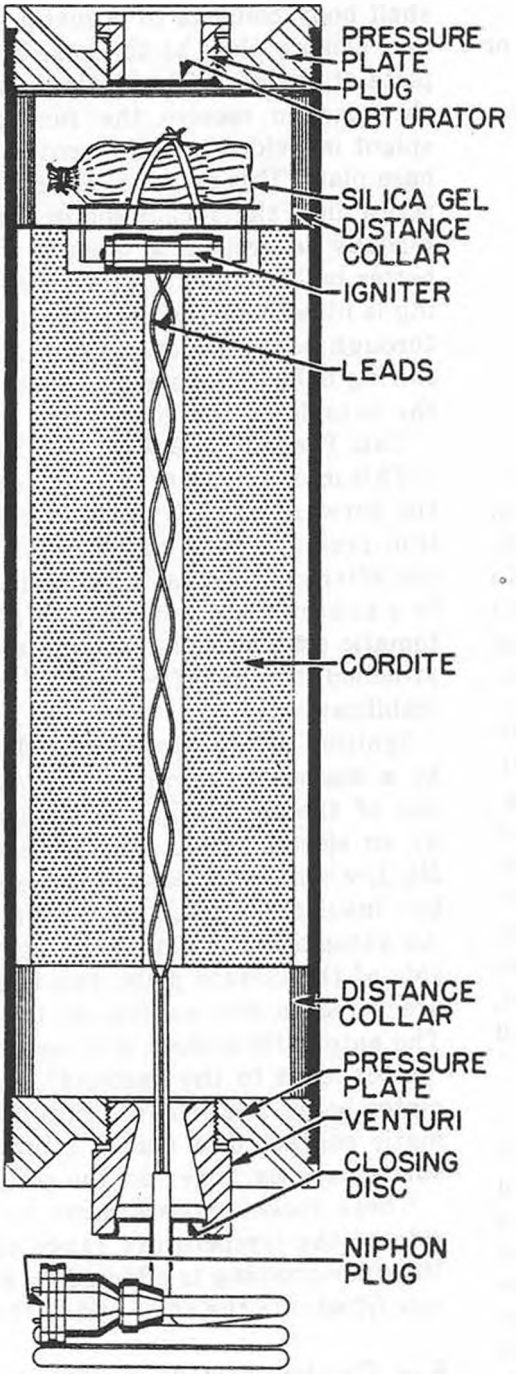


Figure 196—5-in. Cordtex Net Rocket Motor Mk I

net itself has been declared obsolete and is not in service use. The motor, however, remains a service item and may be used in the future for other purposes. The motor was originally called Motor, Rocket, 5-in., Cordtex Net, Mk I. Proposed new nomenclature for the motor is Motor, Rocket, 5-in., No. 3 Mk I.

Description: The motor consists of a steel cylinder, threaded at each end to receive a pressure plate. The pressure plates are threaded internally, the forward one to receive a pressure plate plug and obturator, the after plate to receive the venturi. Two distance collars are beneath the pressure plates to position the cordite propellant grain, which is castellated at the forward end to receive the igniter.

The igniter consists of an electric squib, Fuze, Electric, No. F. 53, surrounded by a magnesium charge enclosed in a cartridge. The igniter leads pass through the central annulus of the cordite grain and through the venturi and closing disc, and end in a two-pronged niphon plug. During shipment and storage, the niphon plug and igniter leads are protected by a tail closing cup, which is fastened to the motor body by adhesive tape.

As a moisture-proofing measure, a bag of silica gel is fitted in the forward end of the motor cylinder.

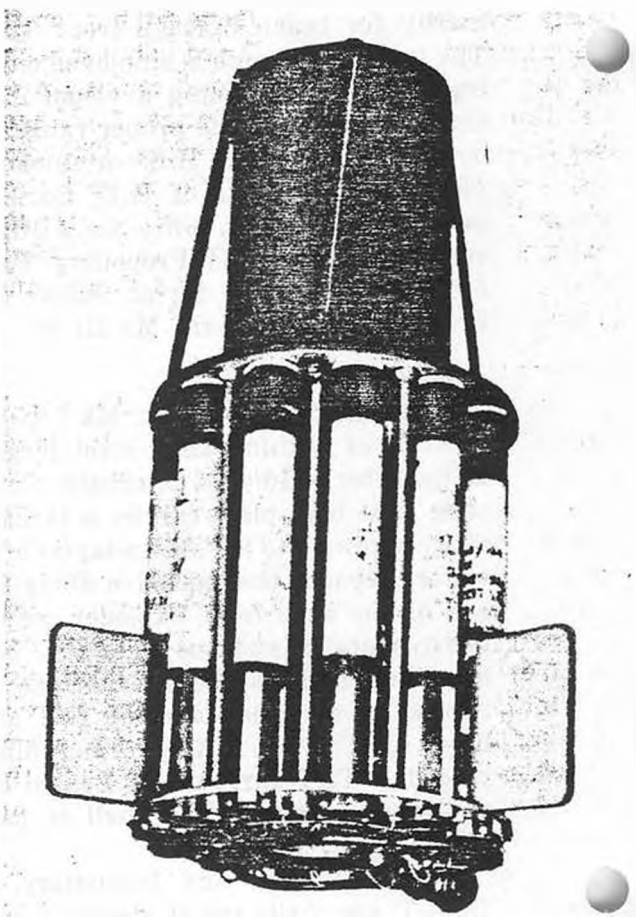


Figure 197—Antisubmarine Rocket Assembly

Antisubmarine Rocket Assembly

Data

Depth Charge

Over-all length	37 in.
Diameter	11 in.
Total weight	260 lb.
Explosive	Amatol
Explosive weight	180 lb.
Fuzing	Depth Charge Pistols Mk XIV or XVI

Rocket Motor

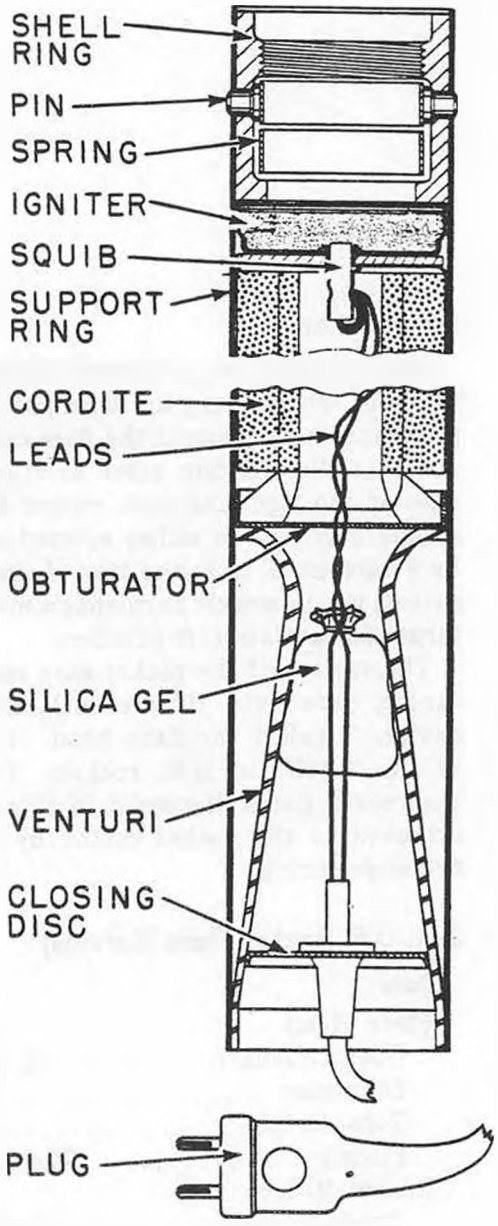
Over-all length	20.25 in.
Diameter	2.25 in.
Total weight	6.0 lb.
Propellant	Cogged cordite (SU/K/C029)
Propellant weight	1.3 lb.
Burning time	0.45 seconds at 60° F.

General: This ammunition is designed for harbor defense purposes and will probably not be used afloat.

Description: The round consists of one Depth Charge Mk XI, without tail (See Part 1, chapter 9, Depth Charges), fitted with 12 Propelling Tails, Rocket, No. 5 Mk II. These motors are mounted in a cylindrical shell encircling the depth charge. The shell measures about 21 in. long by 17 in. external diameter, and weighs about 100 lb. The complete round assembled weighs about 375 lb.

The round is fired electrically from a single-mount, trough-type launcher. The electrical circuit is selectively arranged so that from 4 to 12 motors may be fired, giving ranges varying from 65 to 500 yd. in 50-yd. increments. Large fins may be fitted to the round, but at ranges under 300 yd. fins are usually omitted from the assembly.

Tail, Propelling, Rocket, No. 5 Mk II—This motor consists of a cylindrical steel body with a shell ring fixed in the forward end by eight locking pins held in engagement by a circular band spring. A metal-cased igniter is located immediately behind the shell ring. An electric squib is inserted in the base of the igniter, the leads from the squib extending through the central annulus of the cogged cordite grain and the venturi, and ending in a two-pronged niphon plug. Behind the igniter, positioned by a metal support ring is located the cordite grain, which is supported at its after end by a metal grid. Separating the grid from the venturi is a thin metal tail obturator. The venturi is located in the after end of the motor body and contains a small bag of silica gel as a moisture-proofing measure.



TAIL, PROPELLING, ROCKET, NO. 5 MK II

Figure 198—Motor for Antisubmarine Rocket Assembly

Part 3—Chapter 3

ROCKET FLARES

Introduction

This chapter is concerned with rocket assemblies which carry an illuminating candle. A parachute may suspend the flare candle for purposes of illumination after ejection, as in the case of the 2-in. and 3-in. rocket flares, or the candle may not be either ejected or supported by a parachute, as in the case of the 2-in. target rocket, which merely furnishes a moving, visible target for antiaircraft practice.

The section of the rocket flare containing the candle, parachute (if present), and initiating device, is called the flare head. It corresponds to the "shell" in H.E. rockets. The heads of the rocket flares discussed in this chapter are attached to the rocket motor by the conventional shell ring.

2-in. U.P. Rocket Flare (Service)

Data

Flare Head
- Over-all length .....22 in. (approx.)
- Diameter .....2.25 in.
- Total weight .....4.75 lb.
- Fuzing .....Thermal initiator

Rocket Motor
- Over-all length .....31 in. (approx.)
- Diameter .....2.25 in.
- Width of fins .....2.375 in.
- Total weight .....7.50 lb.
- Propellant .....Tubular cordite
- Propellant weight .....2.5 lb.
- Burning time at 60° F. .....0.9 sec.

General: This flare is used to illuminate enemy targets at night. It is used in conjunction with medium-caliber guns. A flare launcher is mounted on either side of the gun shield at a fixed angle of 30 degrees. This arrangement makes it possible to keep a target illuminated and at the same time engage it with the main armament.

Description

Rocket Flare Head, 2-in., No. 1 Mks I and II, No. 2 Mk I, and No. 3 Mk I—The flare head consists of a cylindrical tinned-plate container, with two cannelures near the base. Inserted in the container is a metal canister, which houses the illuminating candle and attached parachute assembly. A ballistic cap is fitted to the forward end of the container, to which it is secured with adhesive tape. A base socket is secured to the other end of the container by indenting the cannelures. The base socket screws into the shell ring of the rocket motor and contains the thermal ejector. This latter consists of a steel base plate, in the center of which is a metal septum of accurately machined thickness. The lower end of a length of safety fuse (primary delay), cut to burn approximately 22 seconds, makes contact with 2½ grains of lead-dinitroresorcinate (L.D.N.R.), which is stemmed into the septum recess. The upper end of the safety fuse extends into a magazine containing about 40 grains of G.12 gunpowder (primary ejection charge). Protruding from the base end of the canister is a short length of safety fuse (secondary delay) cut to burn for 3 seconds. The lower end of this secondary delay is in close proximity to the primary ejection charge, and its upper end projects into a magazine containing about 40 grains of G.12 gunpowder (secondary ejection charge).

The different flare heads vary only in the contents ejector employed, as follows: Flare Head No. 1 Mk I uses Ejector, Contents, No. 4 Mk I (with 22-sec. delay); Flare Head No. 1 Mk II uses Ejector, Contents, No. 4 Mk II (with 18-sec. delay); Flare Head No. 2 Mk I uses Ejector, Contents, No. 5 Mk I (with 9-sec. delay); and Flare Head No. 3 Mk I uses Ejector, Contents, No. 8 Mk I.

Tail, Propelling, Rocket, 2-in., Mks VI and VII. The Motor Mk VI is identical to the 2-in. Motor Mk III described in Part 3, chap. 2, H.E.

Rockets, except that the obturator of the latter is perforated, while that of the former is not, but rather is rust-proofed to allow free conduction of heat to the thermal fuze in the flare head. For this reason, Motors Mk VI are marked T.I., indicating their use with thermal initiators. No other motor may be used with the flare head.

The Motor Mk VII differs from the Mk VI in that the castellations in the charge are omitted and a metal cased cylindrical igniter is employed.

Operation: When the rocket is fired, heat from the burning propellant grain is transmitted through the head obturator and the thin septum of the thermal ejector, igniting the L.D.N.R. and initiating the lower end of the primary delay. After a set delay, the primary ejection charge is ignited, and the canister is ejected from the container in a forward direction. The secondary delay is initiated by the flash from the primary ejection charge, and, after three seconds, initiates the secondary ejection charge, which ignites the candle and ejects the parachute, cable, and candle in a forward direction from the canister. The parachute opens when ejected from the canister, and the lighted flare candle is suspended in mid-air.

The purpose of the secondary delay is to allow the velocity of the canister to be reduced to a speed at which the flare and parachute assembly may be ejected without danger of break-up.

The flare is ejected at a range of about 5,000 yards and an altitude of about 2,000 feet. The duration of burning of the flare is about 70 sec.

Remarks: This flare, fitted with 4-in. x 1-in. fins, may be fired from a spiral launcher to obtain greater accuracy.

The complete round (flare head and motor) weighs 12.25 lb. and measures 51 inches in over-all length.

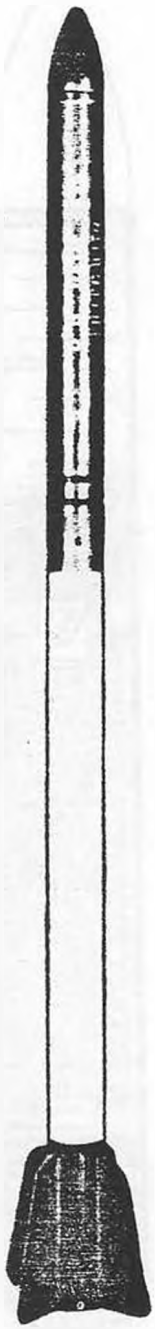


Figure 199—Assembled 2-in. U.P. Rocket Flare

2-in. U.P. Target Rocket (Service)

Data

Target Head:

Over-all length	15.75 in.
Diameter	2.25 in.
Total weight	4.5 lb.
Fuzing	Special igniter

Rocket Motor

Over-all length	20.25 in.
Diameter	2.25 in.
Width of fins	2.375 in.
Total weight	6.0 lb.
Propellant	Cogged cordite
Propellant weight	1.25 lb.
Burning time at 60° F.	0.45 sec.

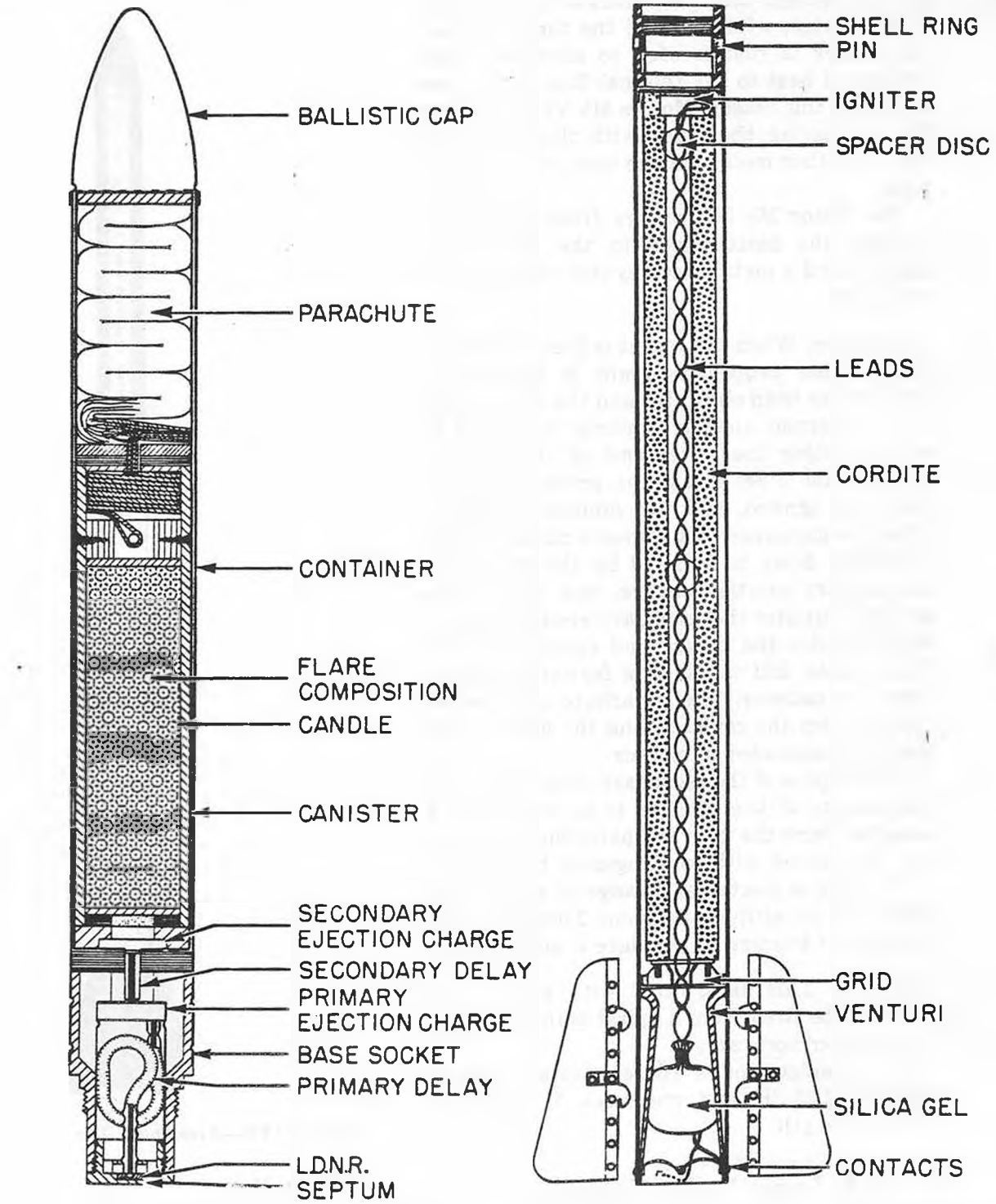


Figure 200—2-in. U.P. Rocket Flare Components

General: This rocket is designed to give, by means of an integral flare, a visible aiming mark for antiaircraft batteries. The target has a range of about 5,000 yards at a speed of 250 to 400 knots. The target can be used at night and is suitable for use from either aboard ship or ashore.

Description

Head, Rocket Target, 2-in. Mk I—The target head consists of a thin sheet-metal container holding a flare candle. Separated from the flare candle by a steeel washer is an externally threaded spigot, by which the head is attached to the shell ring of the rocket motor. The spigot is fixed to the target head body by means of a double crimp. A weight is fitted into the forward end of the body and is fixed to the body by four screws. A ballistic cap is crimped to the forward end of the weight.

Four holes are drilled through the body and the weight just before the flare candle, and a similar set of four holes is drilled abaft the candle through the body and the spigot. The two sets of holes are covered with a strip of tape 1.5 in. wide, which is wrapped around the body.

An igniter mechanism, consisting of a diaphragm-operated striker, a percussion cap, and a gunpowder charge, is inserted into the after end of the spigot and is held in place by a threaded locking ring.

Tail, Propelling, Rocket Target, Mk I—This motor consists of a cylindrical steel body with a shell ring fixed in the forward end by eight locking pins held in engagement by a circular band spring. Separated from the shell ring by a steel, flanged support ring, is an igniter in a cylindrical metal container. Leads from the igniter extend through the central annulus of the cogged cordite grain to four automatic contacts fixed 45° apart on the after end of the motor body. A metal grid supports the cordite grain near the after end of the motor, and a thin metal obturator separates the grid from the venturi. A bag of silica gel is placed in the venturi as a moisture-proofing measure.

This rocket motor must not be fired outside the temperature range of –5 to 130° F. Proposed new nomenclature for this motor is Motor, Rocket, 2-in., No. 4 Mk I.

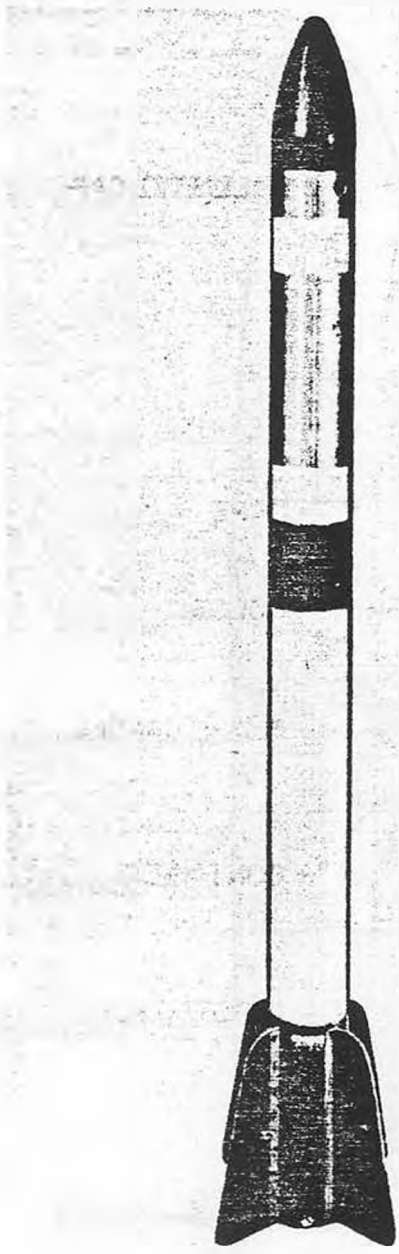


Figure 201—Assembled 2-in. U.P. Target Rocket

Operation: Pressure of the gases from the burning cordite propellant grain passes forward into the spigot of the target head, reversing the diaphragm of the igniter. This forces the striker into the percussion cap and ignites the gunpowder charge, which in turn initiates the flare composition. The flare composition burns brightly, emitting light from the two sets of holes drilled in the body of the target head.

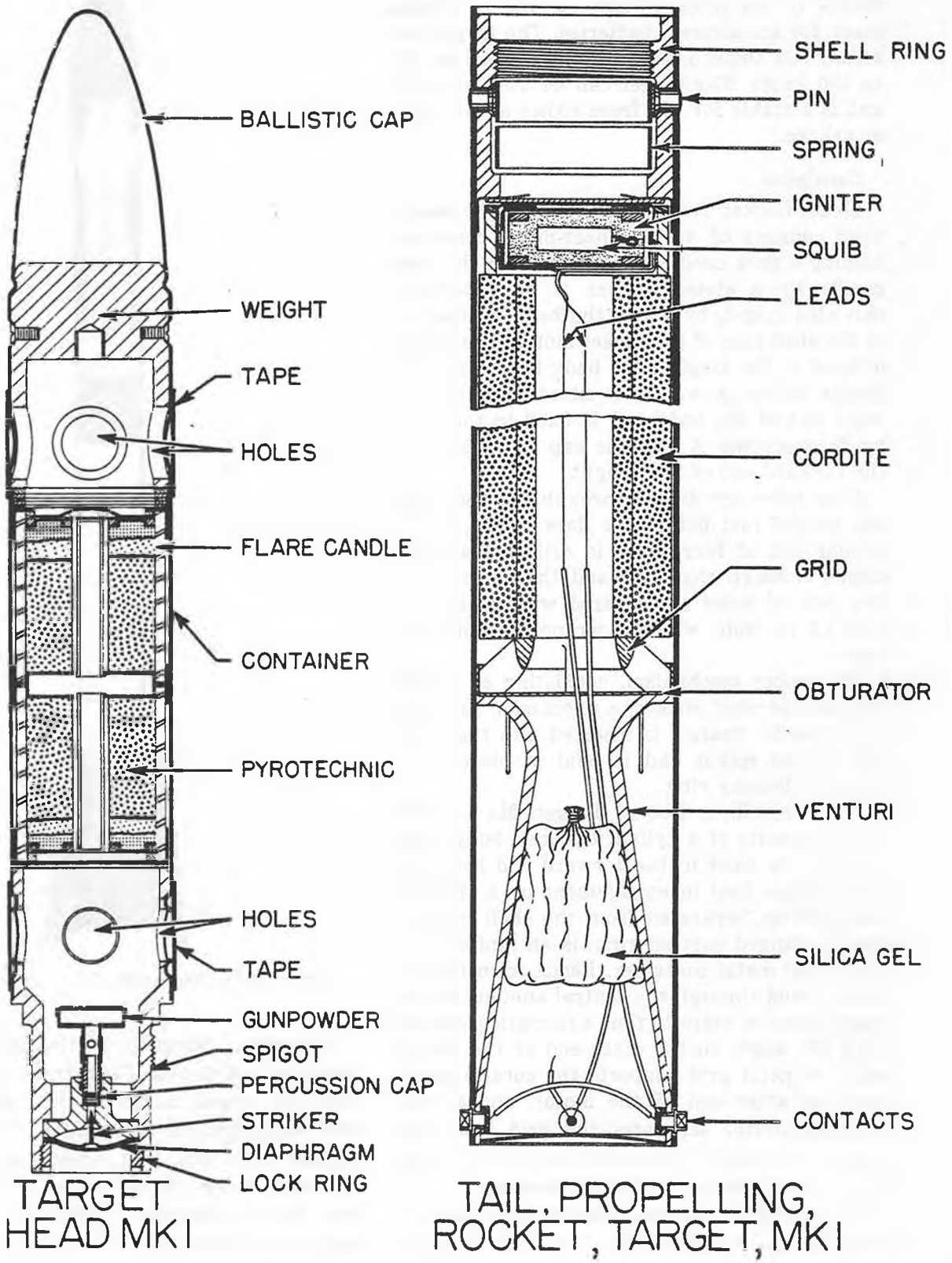


Figure 202—2-in. U.P. Target Rocket Components

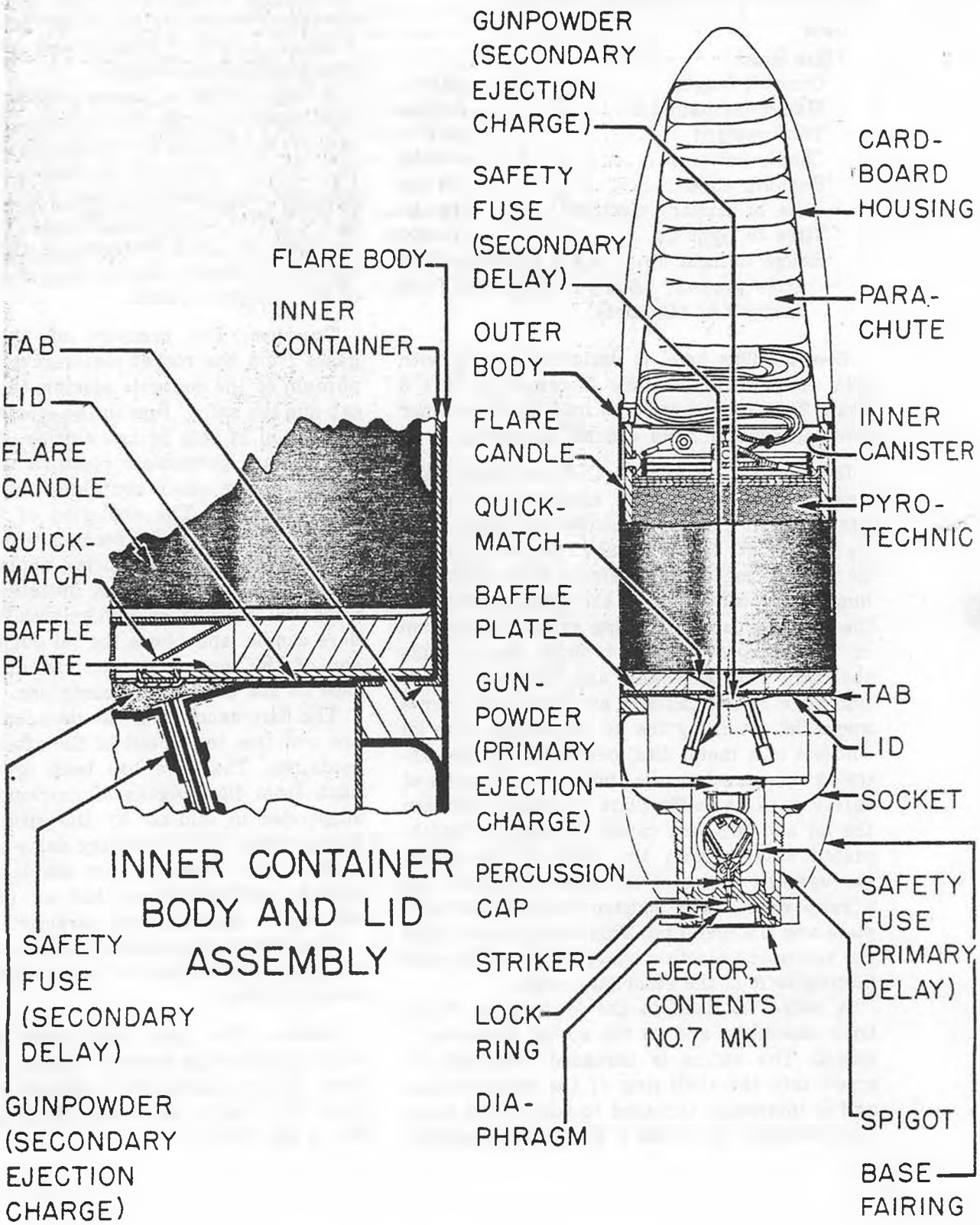


Figure 203—3-in. Aircraft Rocket Flare Head Mk I

3-in. Aircraft Rocket Flare (Service)

Data

Flare Head

Over-all length	22.5 in.
Maximum diameter	5.45 in.
Total weight	14.7 lb.
Candle power	1,000,000
Burning time	70 sec.
Time to primary ejection	16 sec.
Time to light up	19 sec.
Range to light up	4,800 yd. when fired from ground; 5,600 yd. when fired from aircraft at 140 knots

General: This head is designed for use with 3-in. A/C Rocket Motors described in Part 3 chap. 2, H.E. Rockets, and may be fired either from aircraft or from ground launchers.

Description: The 3-in. A/C Flare Head Mk I consists of an outer body assembly and an inner canister. The inner canister is brought to an ogive at its forward end to serve as a ballistic cap. A parachute, enclosed in a cardboard housing, is contained in the upper portion of the inner canister. The long cylindrical portion of the canister is then brought down inside the main body assembly, and tabs on the bottom edge of the canister are then bent over a metal lid, retaining the lid in position. The lid consists of a metal disc, perforated in the center to accommodate the ends of two lengths of safety fuse. A baffle plate is located between the lid and the flare candle. Lengths of quickmatch extend from the base of the candle through the center of the baffle plate and into a gunpowder charge located between the baffle plate and the metal lid. This charge constitutes the secondary ejection charge. The safety fuse leading to it is the secondary delay.

A socket is fixed to the lower part of the body assembly, and to the socket is welded a spigot. The spigot is threaded externally to screw into the shell ring of the rocket motor, and is internally threaded to receive the Ejector, Contents, No. 7 Mk I. The contents ejector consists of a threaded body, housing a diaphragm-operated striker, a percussion cap, and a double length of safety fuse, which extends into a gunpowder charge.

A base fairing is loosely assembled over the lower portion of the body assembly. The after end of the fairing is notched to form several tabs, and a metal clip is placed around these tabs and tightened to ensure a firm attachment to the rocket motor. The fairing serves merely to cover the joint between the flare head and the rocket motor, enhancing the streamlining of the complete round.

Operation: The pressure of the propellant gases from the rocket motor reverses the diaphragm of the contents ejector, thus firing the cap and the safety fuse in the ejector. After the expiration of this primary delay (16 seconds) the primary gunpowder ejector charge is fired, expelling the inner container from the flare body assembly. The explosion of the primary charge also ignites the secondary delay.

When the secondary delay expires, the secondary ejection charge is initiated, which ignites the lengths of quickmatch beneath the flare candle, and blows the lid out of the after end of the inner container, bending back the tabs on the base of the container.

The flare candle and the parachute assembly are now free to fall out of the after end of the container. The flare has been ignited by the flash from the lengths of quickmatch, and is suspended in mid-air by the open parachute. The purpose of the primary delay and ejection charge is to allow the flare ample time to lose velocity sufficiently so that an undue strain will not be placed on the parachute.

The flare head is painted black over-all with a ½-in. red band painted around the flare body near the base.

Remarks: This flare head may be employed with the following motors: Motor, Rocket, A/C, 3-in. (Rocket Flare) Mk I; Motor, Rocket, A/C, 3-in. No. 1 Mk I; or Motor, Rocket, A/C, 3-in. No. 1 Mks II-IV.

WIRE-BARRAGE ROCKETS

Introduction

This chapter deals with four rockets, which are designed to erect a vertical barrage consisting of parachute-supported cables, or parachute-supported wires carrying H.E. bombs. These devices provide a temporary lethal deterrent to planes employing low-level attacks or dive-bombing tactics, and are supposed either to destroy or damage the attacking planes, or to cause them to abandon the attack.

Apparatus A.D. Type B Mk I (Obsolescent)

Data

Over-all length .....37.0 in.
Diameter .....7.0 in.
Total weight .....37 lb.
Propellant .....Tubular cordite
Propellant weight .....3.9 lb.
Charge igniter.....Magnesium (S.R. 371)
Separating charge ..154 grains G.12 gunpowder
Mine wire .....1,000 ft. of steel piano wire
Bomb.....H.E., A.A.D., No. 2 Mk I
Bomb weight .....1 lb.
Explosive .....C.E. (tetryl)
Explosive weight .....8 oz.

General: This rocket is employed to lay a curtain of aerial mines in the path of low-level or dive-bombing aircraft attacking a ship.

Description: The tail of the rocket consists of a center tube containing the propellant charge, the gases from which emerge through the venturi to propel the projectile. The propulsive force continues for about 1½ seconds. Around the center tube is fitted a fairing to which are attached tail fins, protected by a cylindrical shroud. The electric igniter leads pass through the tail fins, enter the center body of the rocket, and lead to the electric igniter. Connected in parallel to the igniter is an electrically fired time fuse, which burns through to ignite the

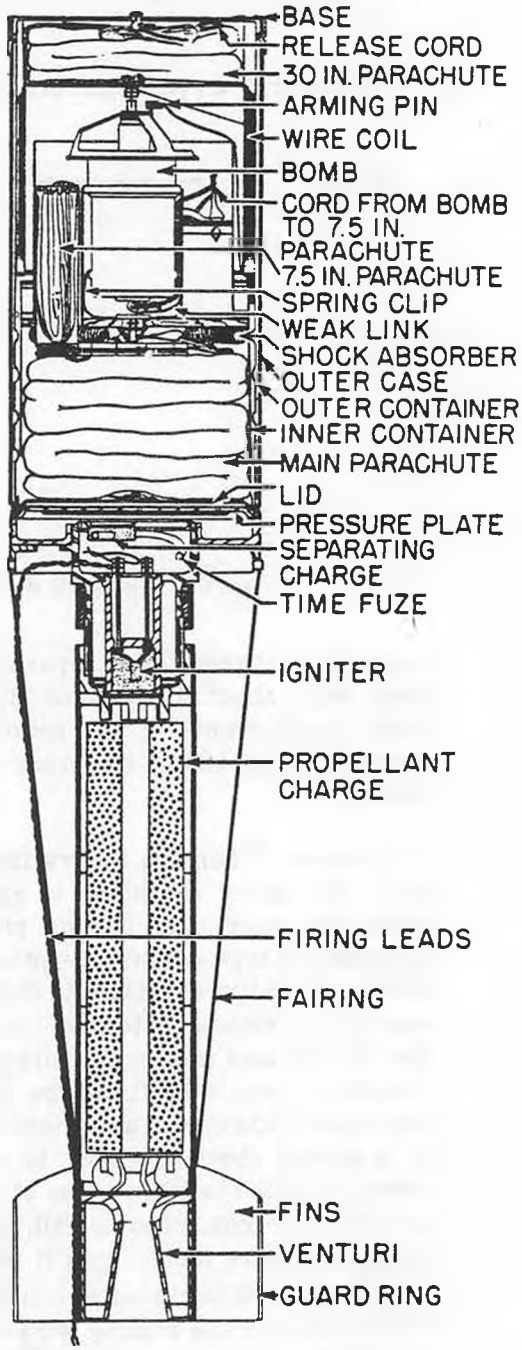


Figure 204—Apparatus A.D. Wire-Barrage Rocket Type B Mk I

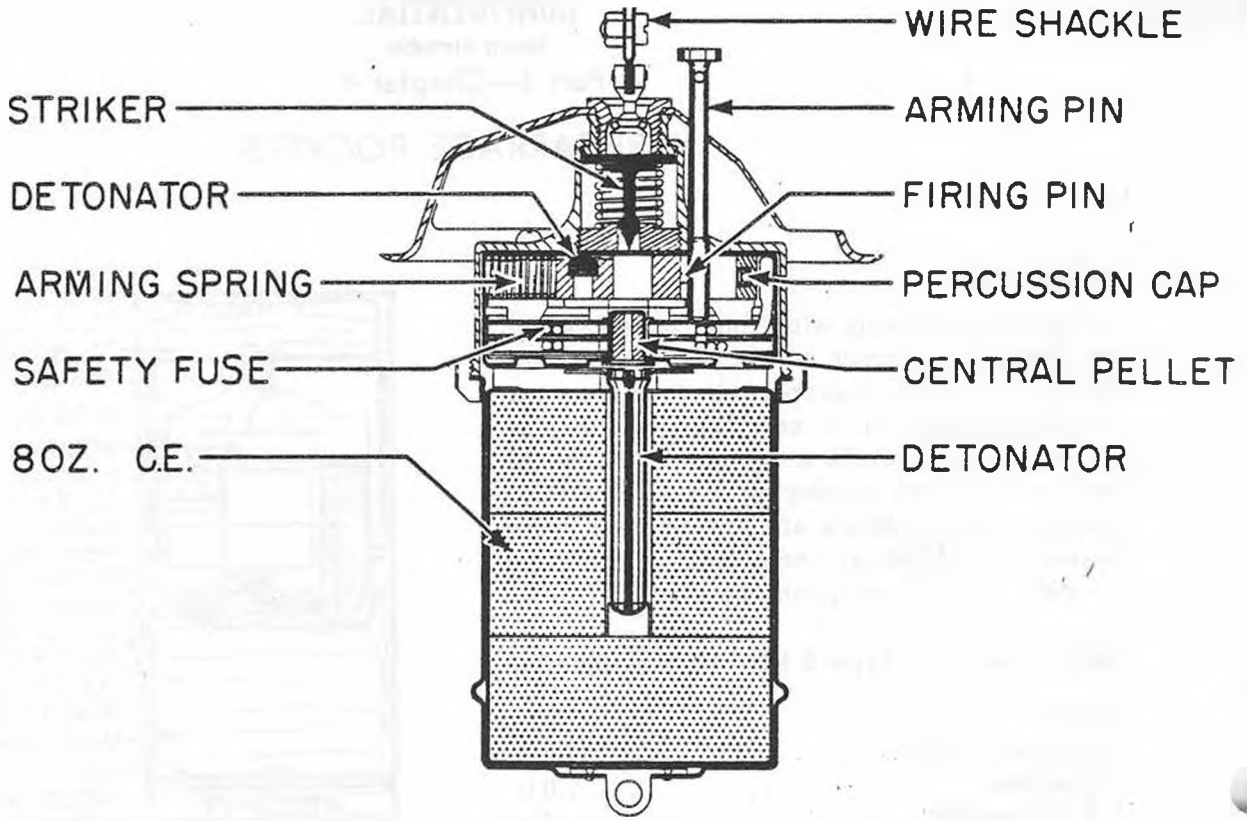


Figure 205—Bomb A.A.D. No. 2 Mk I for A.A.D. Wire-Barrage Rocket Type B Mk I

separating charge. The separating charge is fired after about 10 seconds flight time, and ejects the contents of the rocket head, which consist of the bomb, the mine wire, and the parachutes.

Operation: When the separating charge is ignited, the outer container is ejected forward from the outer case by the pressure of the exploding charge against the pressure plate. As soon as the outer container is clear of the outer case, the pressure plate and the lid fall clear. The lid acts as a pilot parachute and withdraws the main parachute from the container. The main parachute opens, and, since it is connected by a spring shock absorber to the inner container, it pulls the latter clear of the outer container, which continues to fall, paying out the coiled mine wire inside it as it falls.

Also attached to the outer container is a cord, which pulls out the arming wire of the bomb as the two containers separate. This cord subsequently breaks away to clear the wire which is being paid out. The upper end of the mine wire is attached to the bomb and jerks it clear of its retaining-spring clip in the inner container. The bomb is then suspended from the shock absorber by a length of light cord, termed the weak link. This cord is secured to the shock absorber at one end, and at the other to a length of heavy cord leading from the bomb to the 7½-inch parachute carried in the inner container. The heavy cord is thus slack between the knot and the parachute.

When all the mine wire has been paid out, the bottom bundle, containing the 30-inch parachute, is withdrawn from the outer container. The canvas bands which protect the bundle on its way out of the container are then pulled clear by the release cord, and the bottom bundle is left hanging from the wire. This state is accomplished about eight seconds after separation of the outer container from the rocket.

When the mine wire is struck by an aircraft, the weak link between the bomb and the shock absorber breaks, and the 7½ inch parachute is pulled clear of the inner container and springs open. The tautening of the wire also rips the

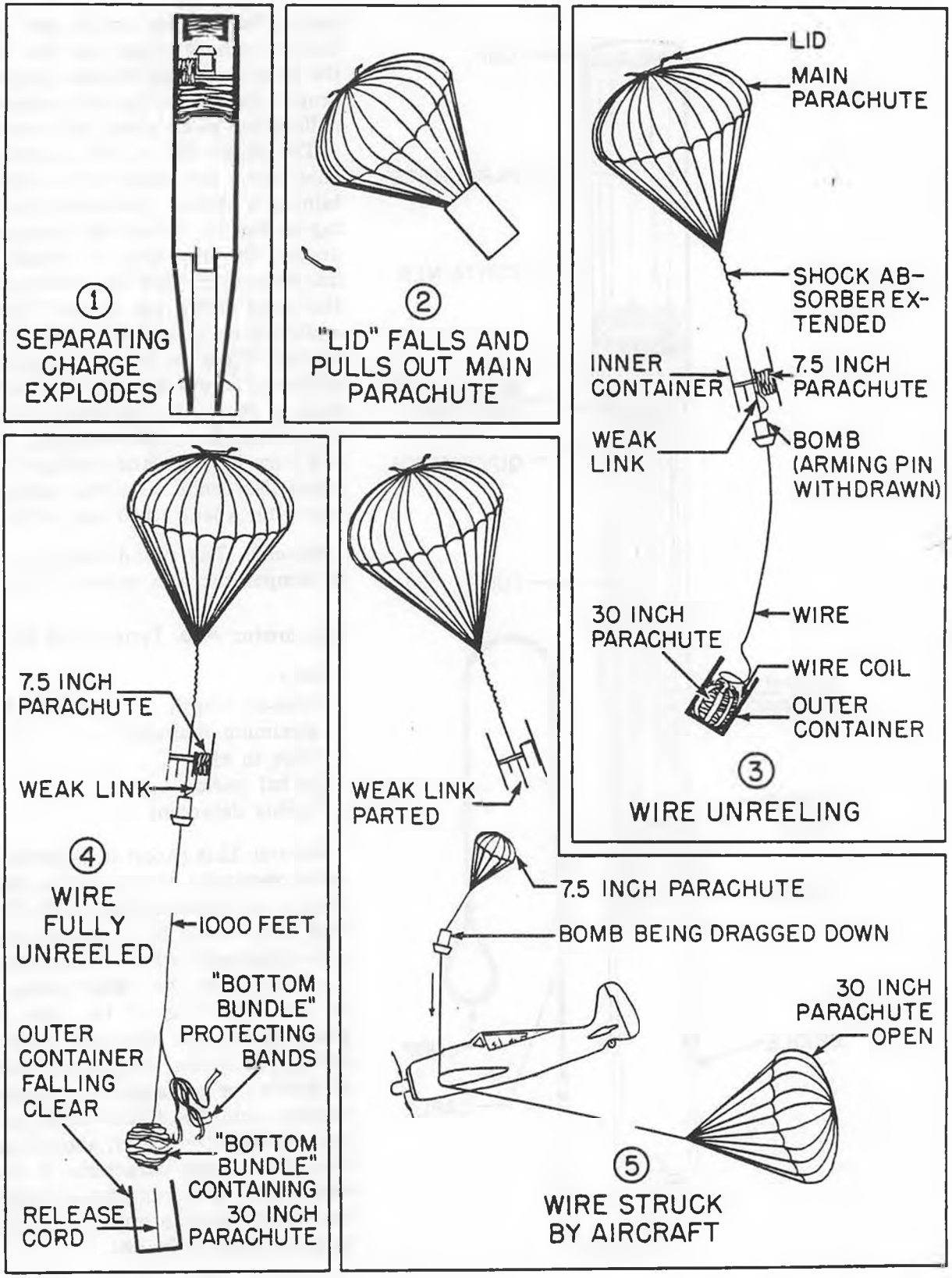


Figure 206—Operating sequence of A.A.D. Wire-Barrage Rocket Type B Mk I

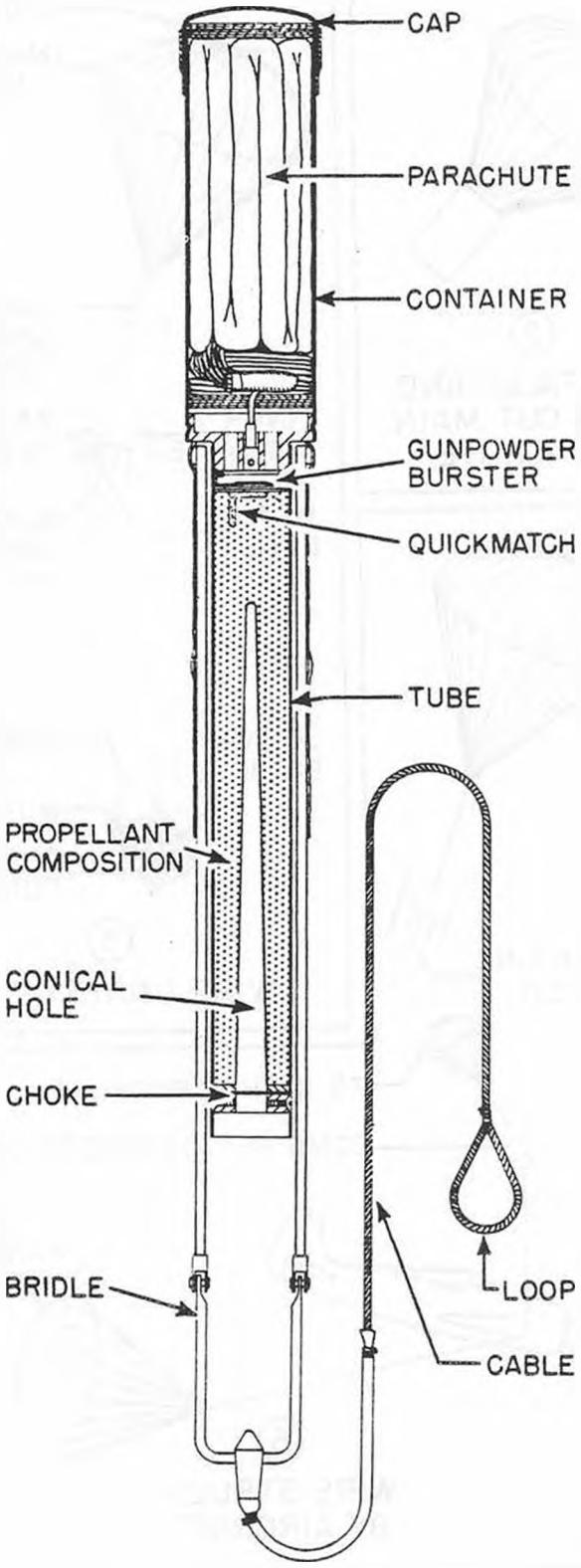


Figure 207—Apparatus A.D. Wire-Barrage Rocket Type D Mk III

bag of the bottom bundle, and the bottom 30-inch parachute opens. As the aircraft pushes the wire along, the bottom parachute acts as a drogue and drags the wire across the aircraft, pulling the bomb down into contact with it.

The Bomb No. 2 Mk I consists of a light sheet-steel case filled with explosive and containing a striker, detonator, and self-destroying assembly. When the arming pin is withdrawn, the detonator is forced by its spring into alignment with the striker. Simultaneously the delay firing pin on the detonator carrier strikes the cap and a length of safety fuse is ignited. When the bomb strikes the aircraft, the striker is forced in and fires the detonator, exploding the bomb instantaneously. If the wire is not struck by the aircraft, the safety fuse will burn through and detonate the bomb after about 95 seconds. Thus the bomb is self-destructive after about 1,250 feet of fall.

Remarks: The round should not be subjected to temperatures in excess of 110° F.

Apparatus A.D. Type D Mk III (Service)

Data

Over-all length .....34.25 in. (approx.)
Maximum diameter .....3.45 in.
Time to eject .....5 sec.
Lethal period .....7 sec.
Visible deterrent .....12 sec.

General: This rocket is designed to erect lethal wires vertically over a ship in the path of low-level or dive-bombing aircraft. The wire is carried into the air by a rocket and is suspended by a parachute, which is carried in a container in the head of the rocket motor. A parachute on the lower end of the wire opens when a plane strikes the wire and offers sufficient resistance to throw the aircraft momentarily out of control or to cause it to break up. The apparatus remains lethal until its lower parachute strikes the water, about 7 sec. after ejection of the upper parachute. It continues to act as a visible deterrent for an additional 5 sec., by which time the upper parachute has fallen to an ineffective height.

Description: The rocket consists of a tube filled with rocket-propelling composition having a conical hole down the center. This hole is aligned

with that in a choke in the after end of the tube. A length of quickmatch and a gunpowder burster charge are located in the forward end of the tube immediately below the parachute container. The parachute container holds the folded parachute and is closed at the forward end by a metal cap. The parachute is connected to the forward end of the rocket motor tube.

A steel bridle and a cable are attached to the motor tube. The cable is fitted with a loop for attachment to the main cable from the lower canister.

The lower canister consists of a cylindrical or rectanguar box, which contains about 400 ft. of cable. To the lower end of the cable is attached a 38-in. drag parachute. The forward end of the cable is attached to the cable leading from the bridle on the rocket motor.

Operation: When the projector, loaded with rocket and cartridge, is fired, the flash from the cartridge ignites the rocket propellant composition, which propels the rocket along its trajectory. As the rocket rises, it uncoils and carries with it the main cable from the lower container, which remains fixed to the rocket projector. When the cable is completely uncoiled, it withdraws the drag parachute from the container. This parachute is fitted with an explosive link arrangement, allowing the parachute to open 3 sec. after firing.

When the propellant composition is completely burned out, the length of quickmatch in the head of the tube is ignited and in turn initiates the gunpowder burster charge. This charge ejects the upper parachute from its container, leaving the rocket tube and the wire cable suspended in the air.

When an aircraft strikes the wire, the lower parachute opens and offers sufficient resistance to throw the plane out of control or to cause it to break up.

Apparatus A.D. Type J Mks I, IA, and II (Service)

General: This rocket is designed to erect a lethal wire vertically over a ship in the path of low-level or dive-bombing aircraft. The wire acts both to bring down the aircraft if it strikes the wire, and as a visible deterent to force the aircraft to abandon the attack.

Description: The head canister is a light cylindrical metal container, into which is packed a 62-inch parachute, called the top parachute, the cords of which are firmly secured to the base of the head canister. A thermal fuze is fitted into the head canister and consists of a pellet of L.D.N.R., a length of safety fuse, and 100 grains of G.12 gunpowder, which acts as an ejection charge.

The Tails, Propelling, 2-in., Mks IVA and VA are standard 2-inch rocket motors, with a rigid stirrup welded to their after end. No fins are fitted to the motor. Contained within the motor body is a tubular cordite grain, into the head of which is fitted an electrical igniter. The after end of the motor is sealed off by a light metal closing disc, through which pass the ends of the igniter leads terminating in a two-pin plug. The proposed new nomenclature for the rocket motors is Motor, Rocket, 2-in., No. 2 Mks I and II.

The main container is a cylindrical-shaped metal container about 14 inches in diameter, with a removable lid. Inside the container are two smaller concentric tubes, the outer of which is cone-shaped, while the inner is cylindrical. Also encased within the main container are 825 feet of wire, a fabric bag into which is packed a 62-inch diameter parachute called the lower parachute, and a 20-inch diameter parachute called the trail parachute.

The wire is coiled down between the cone-shaped cylinder and the main container, and swivels are attached to the top and bottom ends of the wire. The bottom swivel is shackled to the ring at the foot of the cords of the lower parachute, with the ring just protruding through the fabric bag. Cords which keep the bag closed are connected to the trail parachute by a weak cord connection and a rip cord. The trail parachute and fabric bag are packed into the small central cylinder, and have the swivel passing through a special slot. The cylinder is then sealed with a light metal lid.

Operation: The rocket is fired when the attacking plane is within about 800 yards of the ship. The wire is fully run out 3½ seconds after firing, and pulls the lower parachute bundle and the trail parachute up out of the inner cylinder, the lid of which is ripped off by the bottom swivel as it is pulled up. Meanwhile the

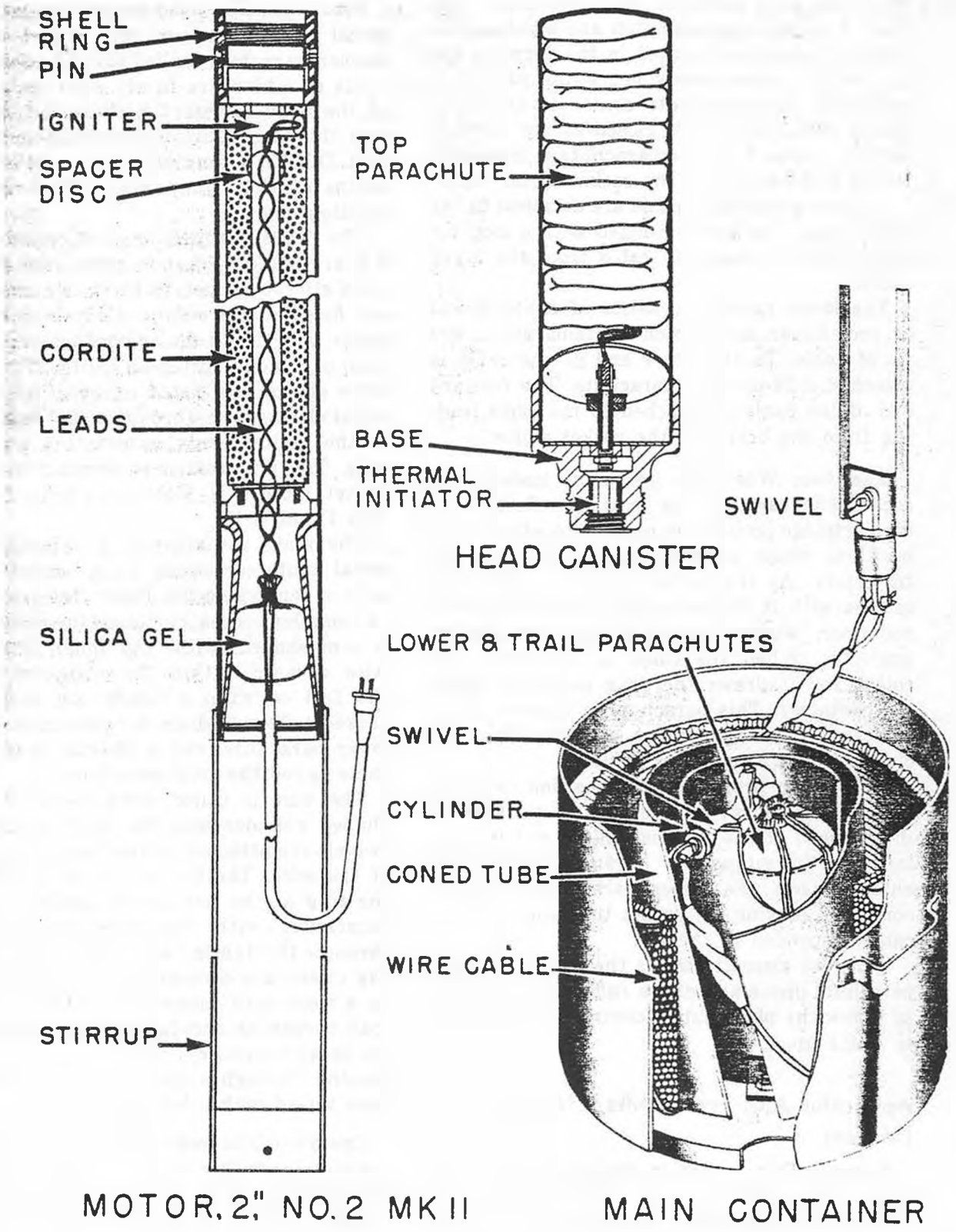


Figure 208—Components of Apparatus A.D. Wire-Barrage Rocket Type J

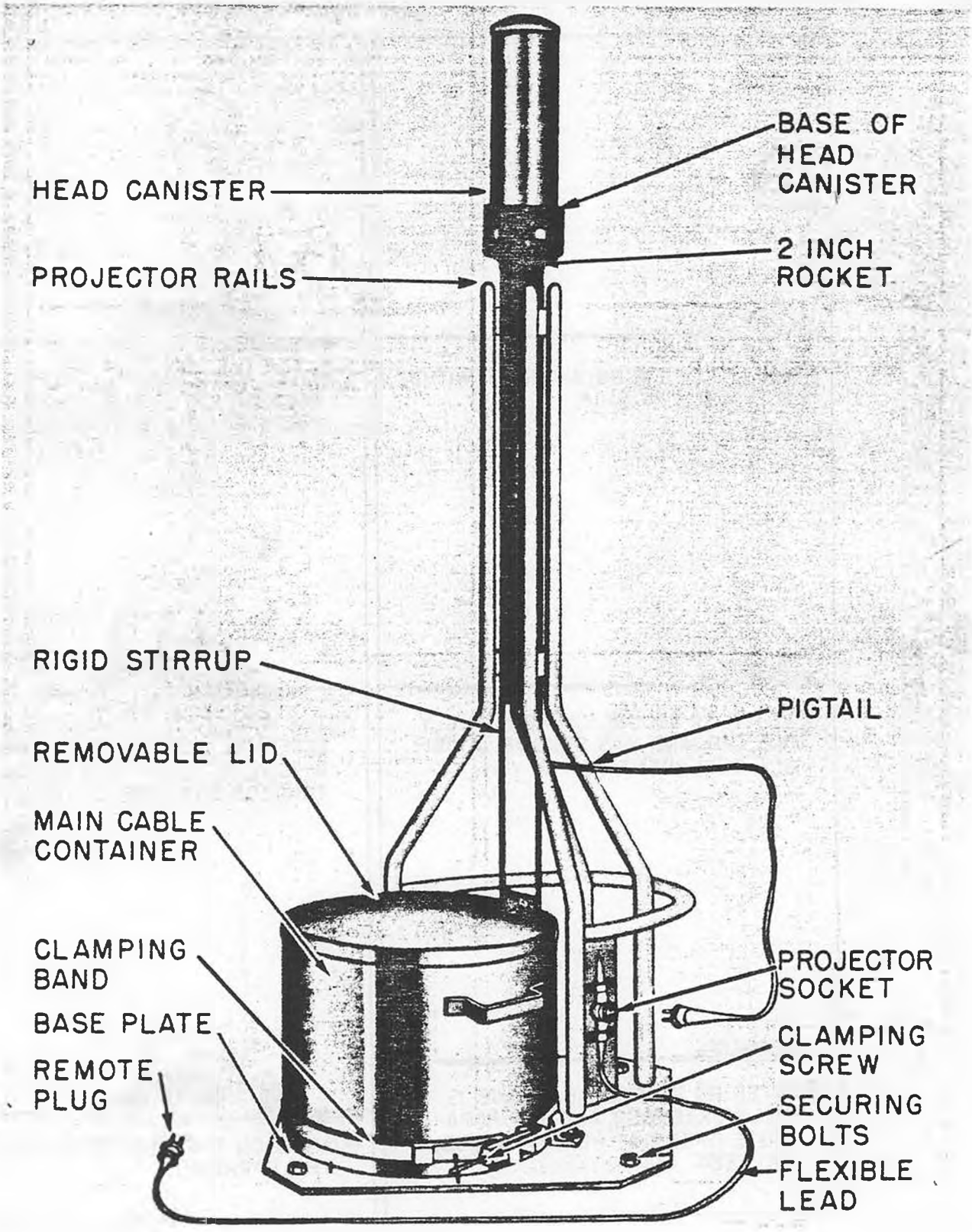


Figure 209—Loaded projector for A.A.D. Wire-Barrage Rocket Type J

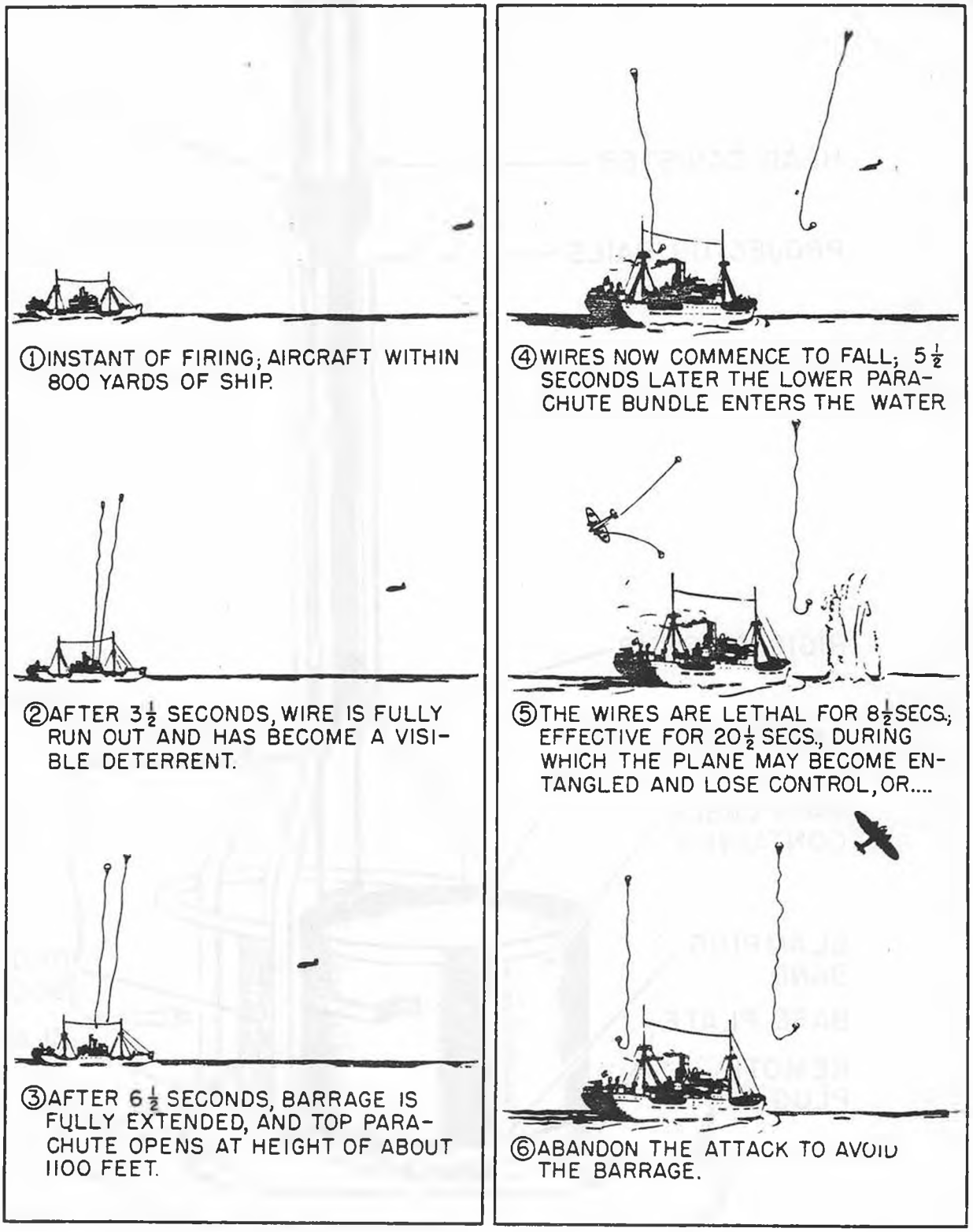


Figure 210—Operating sequence of A.A.D. Wire-Barrage Rocket Type J

heat from the burning cordite grain ignites the L.D.N.R. pellet in the thermal fuze, and this in turn ignites the safety fuse. The safety fuse burns for about 6½ seconds and then initiates the gunpowder ejection charge, blowing off the top part of the head canister and allowing the top parachute to open. This occurs at an altitude of about 1,100 feet. The lower parachute, still wrapped in its bag, is suspended at the bottom of the wire, and the trail parachute, which is now open, is attached to the bundle by the weak cord connection and the rip cord. After the top parachute opens, the wire begins to fall at about 42 ft./sec. Twelve seconds after firing, the bottom parachute enters the water. As soon as this occurs, the wire ceases to be lethal, but it remains a visible deterrent for an additional 12 seconds, by which time the top parachute has fallen to an ineffective height.

If the plane strikes the wire during its lethal stages, the pull on the wire breaks the weak cord connection between the lower parachute and the trail parachute. This allows the trail parachute to pull the rip cord on the bundle, opening the fabric bag and freeing the lower parachute. The sudden jerk caused by the wind operating on the lower and top parachutes is sufficient to throw the plane momentarily out of control, or in some cases to cause it to break up.

Remarks: The round must not be fired outside of the temperature range of 0 to 120° F., except motors marked "S.U./K." which may be fired within the range of −5 to 130° F.

The Apparatus Mk I differs from the Mk II in that the ceiling height of the rocket is 800 ft., and the wire is only 600 feet long.

Apparatus A.D. Type L Mks I, IA, II, and IIA (Service)

Data

Canister length .....32.7 in. (approx.)
Canister diameter .....6.8 in.
Motor length .....31 in. (approx.)
Motor diameter .....2.25 in.

Use: The purpose of the Type L apparatus is to lay a curtain of aerial mines in the path of low-level or dive-bombing aircraft.

Description: The Canister Mk I consists of a conical upper container, which is connected to the tail of a 2-inch rocket motor by a short rod and a stirrup. In the upper container are a parachute to bring down the spent motor, etc., the main support parachute, a bomb steady parachute, and the bomb. These items are all held in position by three retaining cords, which are controlled by an explosive link.

The swivel on the lower end of the bomb is connected to the top end of a 1,000-ft. coil of steel piano wire, which is contained in the lower container. The wire from the bomb passes to the top of the coil through a slot cut in the central tube. The central tube is provided to aid in unspooling the wire and avoid failures due to kinking. The lower end of the 1,000-ft. coil of wire passes back through the slot in the central tube and is connected to a long, light shock absorber, whose lower end is attached to the drag parachute assembly. This latter consists of a 32-in. drag parachute housed in a bag and prevented from opening on the initial jerk at pick-up by four retaining cords controlled by an explosive link. The junction between the upper and lower containers is effected by crimping parts of the base of the upper container lightly over the top of the lower container.

The electric leads for igniting the electric delay fuzes extend from the base of the lower container and terminate in a two-pinned plug which fits into a socket on the projector.

The Bomb, H.E., A.A.D., No. 8 Mk I consists of a light sheet-steel cylinder filled with explosive. A detonator is held in a shutter which is normally kept out of alignment with the striker by a clock spring. An arming vane is attached to the outside of the bomb casing, and this vane, by means of a pinion wheel, is enabled to move the shutter sufficiently to align the detonator with the striker.

The Tail, Propelling, 2-in., Mks IVB and VB consists of a slightly modified 2-inch standard rocket motor. A closing plug is placed in the shell ring, and the electric leads terminate in a two-pin plug, which engages a socket on the projector. The propelling unit is connected to the canister assembly by a 12-inch steel stirrup and a steel connecting rod 18 inches long. A quick-fastening bolt is provided in the top of

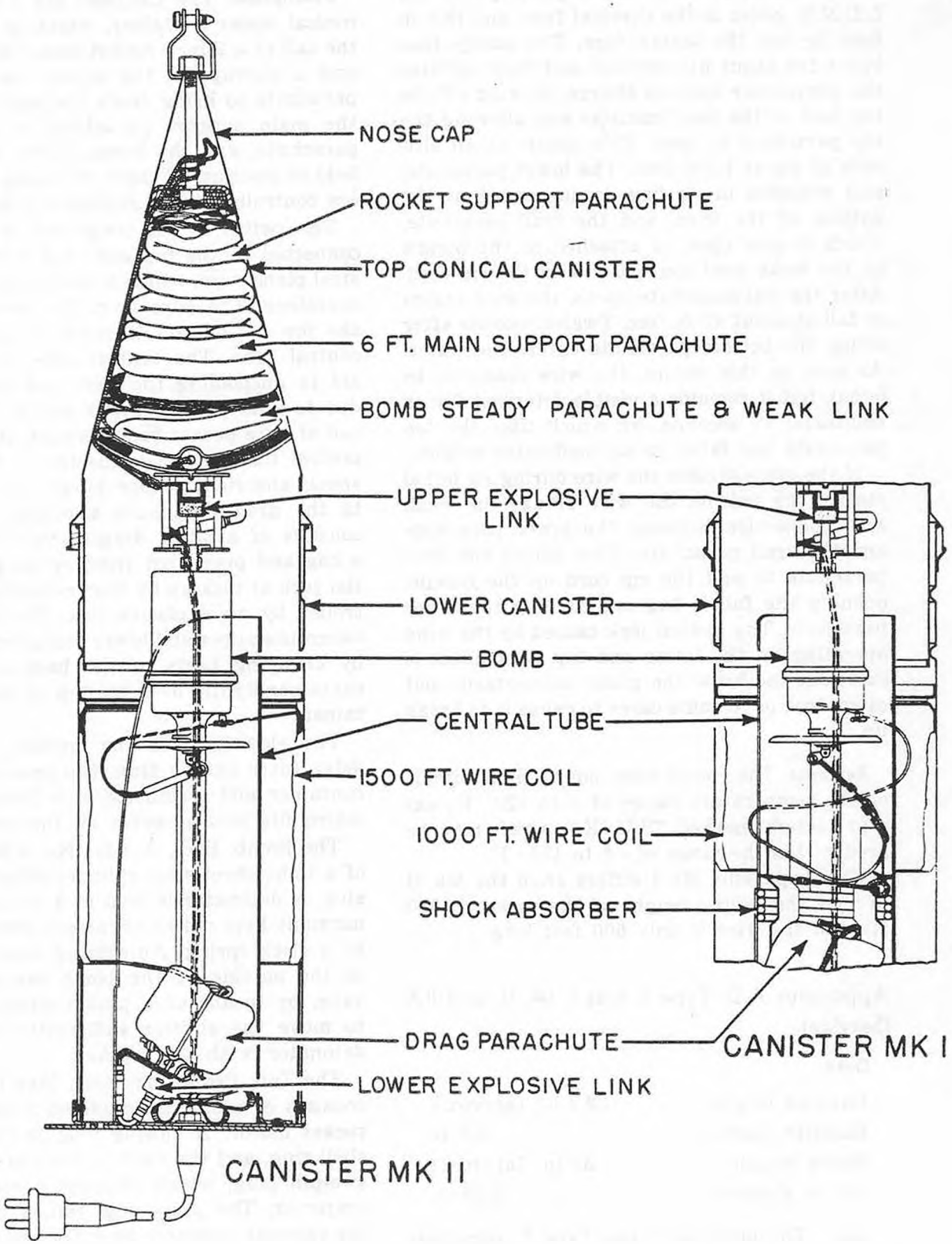


Figure 211—Canisters for Apparatus A.D. Wire-Barrage Rocket Type L

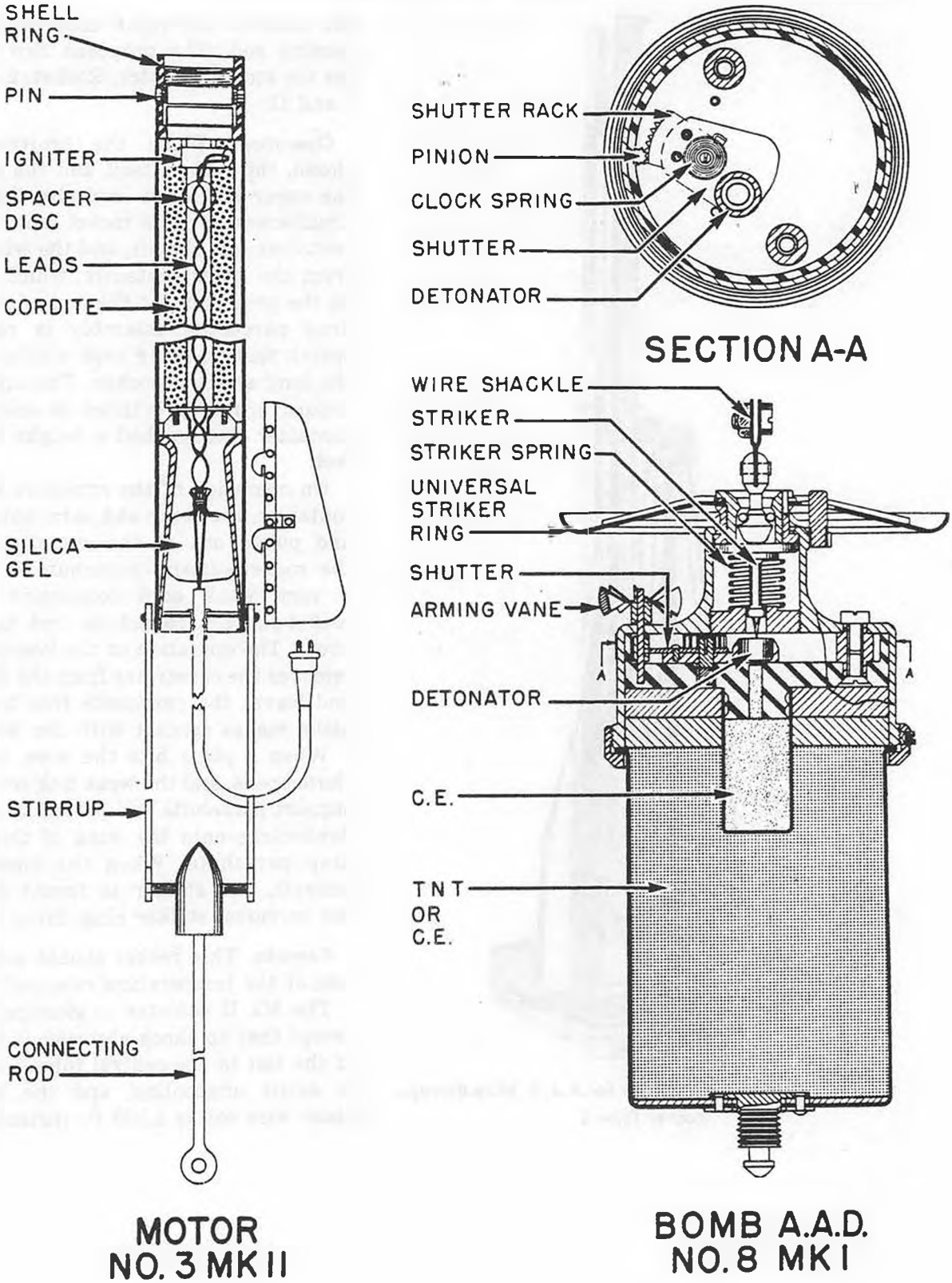


Figure 212—Motor and bomb for A.A.D. Wire-Barrage Rocket Type L

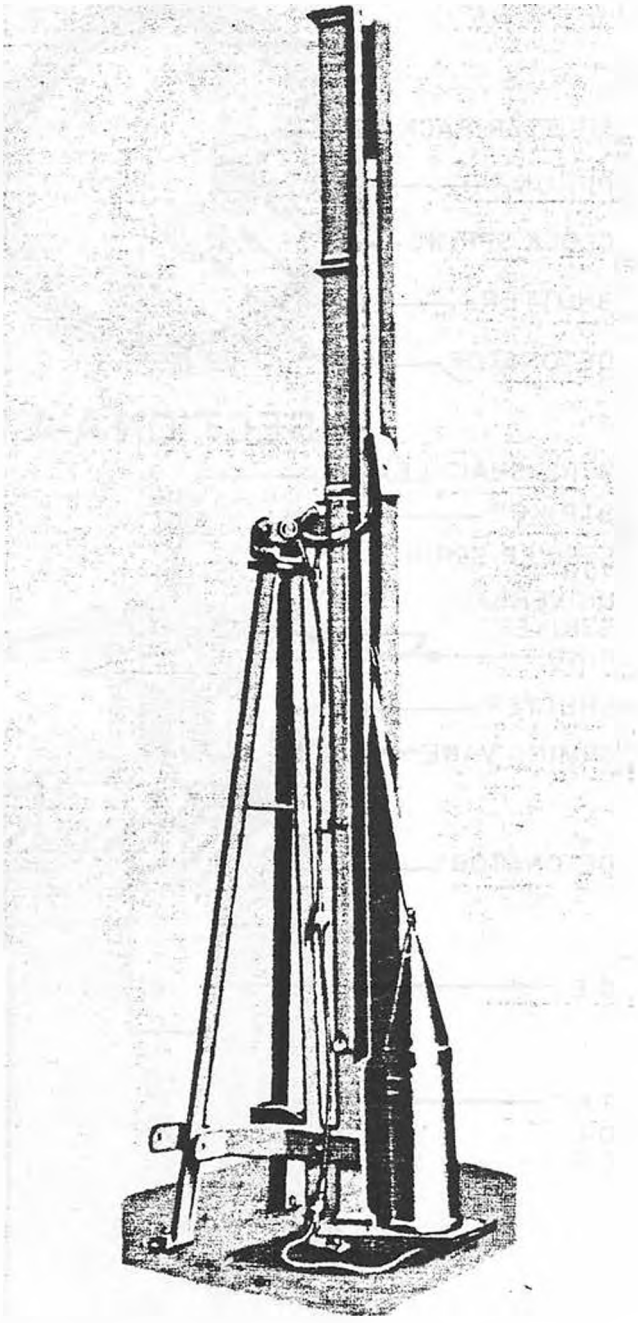


Figure 213—Loaded projector for A.A.D. Wire-Barrage Rocket Type L

the canister for rapid connection to the connecting rod. The proposed new nomenclature for the motor is Motor, Rocket, 2-in., No. 3 Mks I and II.

Operation: When the projector switch is closed, the rocket itself and the delay fuzes on the upper and lower explosive links are ignited simultaneously. The rocket motor tows the top container into the air, and the wire is unspooled from the lower container, which remains fixed on the projector. At the end of unspooling, the drag parachute assembly is picked up, the snatch tension being kept within safe limits by the long shock absorber. The upper and lower explosive links are timed to operate when the container has reached a height of about 2,000 feet.

On operation of the explosive link in the top container, the bomb and parachutes are released and pulled out of the container. Ejection of the rocket-support parachute is facilitated by a very weak cord connection between the rocket-support parachute and the main parachute. The operation of the lower explosive link removes the constraint from the drag parachute and leaves the parachute free to open when a plane makes contact with the wire.

When a plane hits the wire, the drag parachute opens, and the weak link securing the 6-ft. support parachute will part. The bomb is pulled downwards onto the wing of the plane by the drag parachute. When the bomb strikes the aircraft, the striker is forced downwards by the universal striker ring, firing the detonator.

Remarks: This rocket should not be fired outside of the temperature range of 0-120° F.

The Mk II canister is identical to the Mk I, except that no shock absorber is fitted, one side of the slot in the central tube is slightly flared to assist unspooling, and the length of the piano wire coil is 1,500 ft. instead of 1,000 ft.

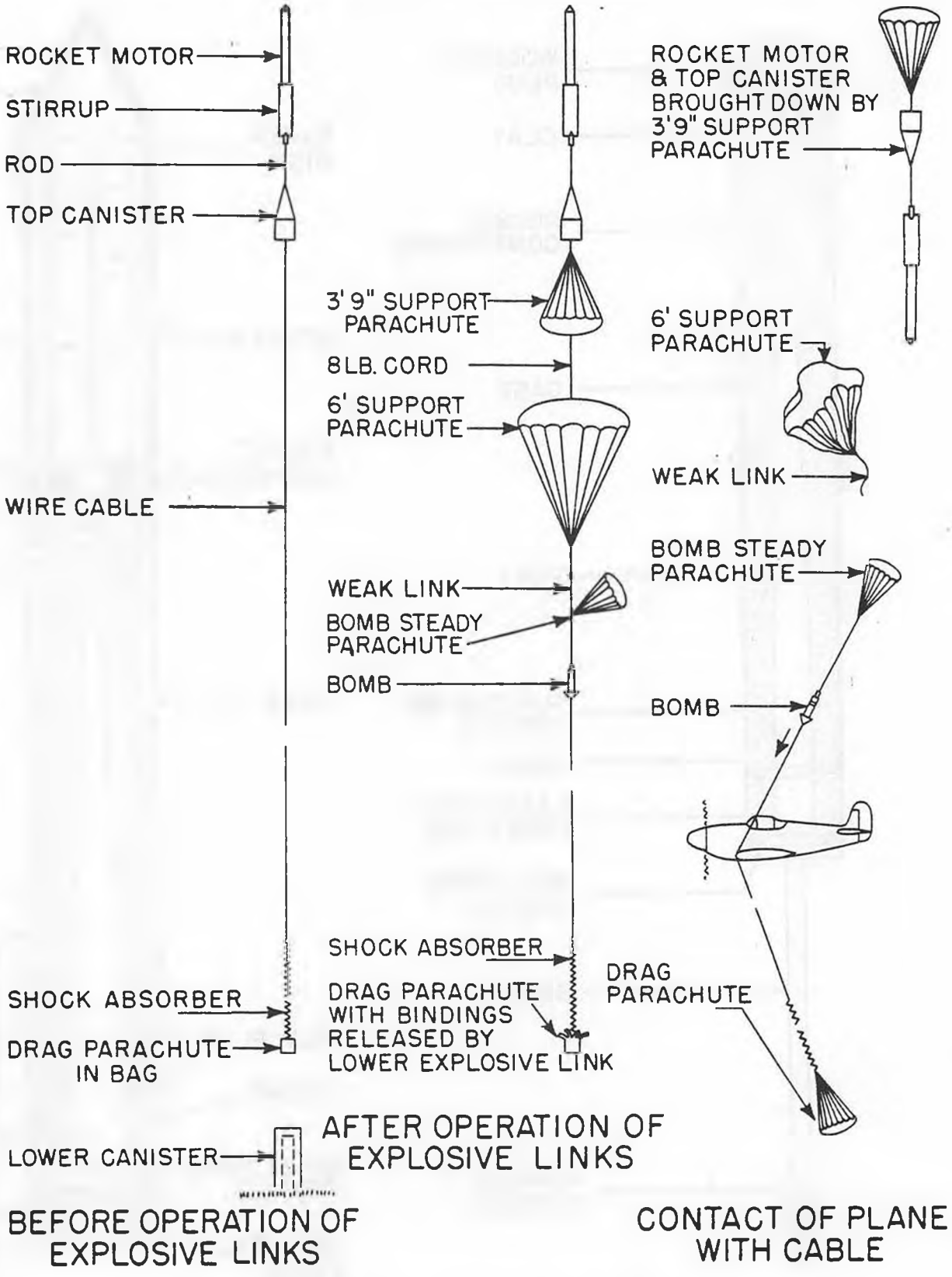


Figure 214—Operating sequence of A.A.D. Wire-Barrage Rocket Type L

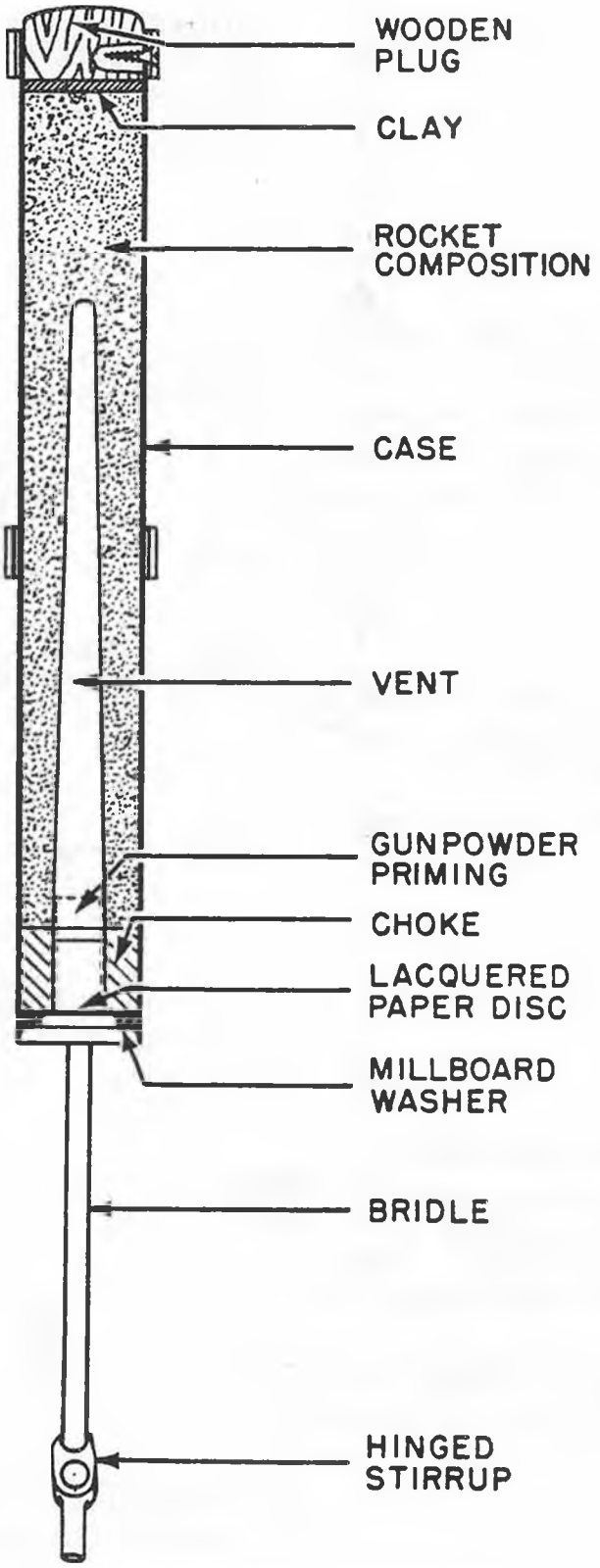


Figure 215—Kite-Launching Rocket Mk II

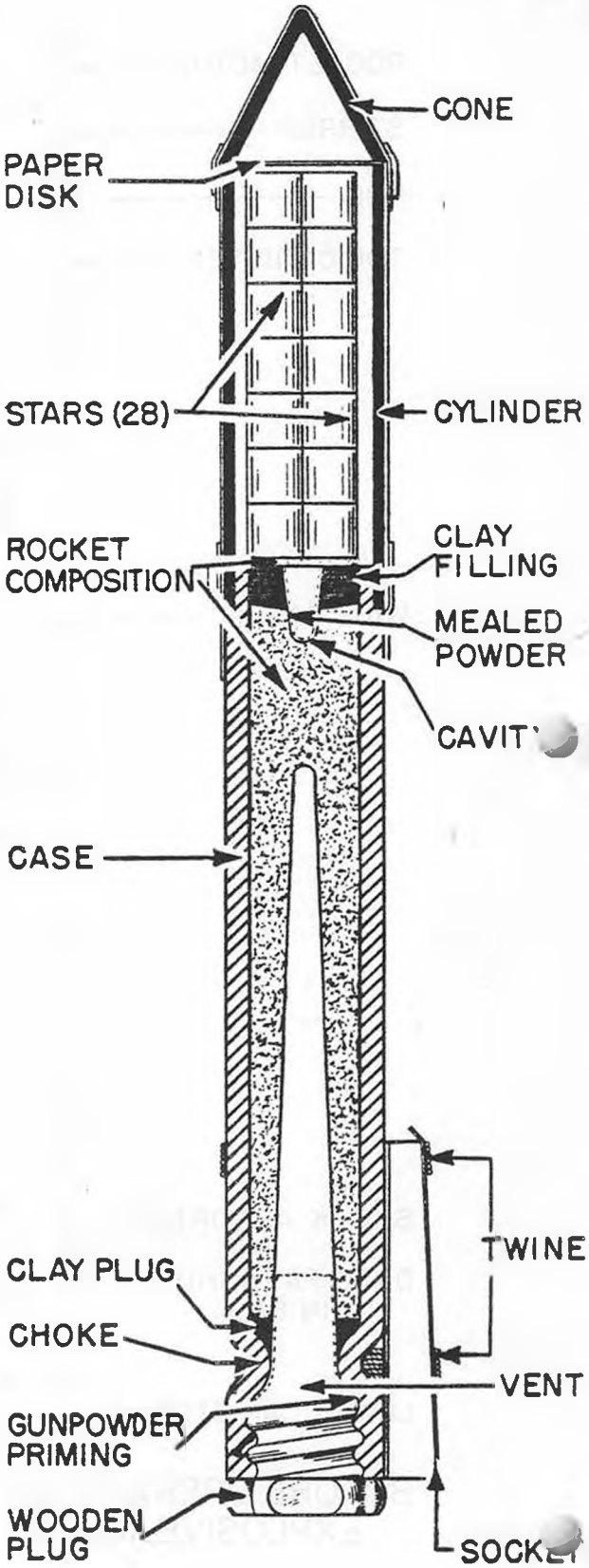


Figure 216—1-lb. Signal Rocket Mk III

PYROTECHNIC ROCKETS

Introduction

Pyrotechnic rockets are relatively small pyrotechnic items, similar in principle to the familiar sky-rocket, which are used mainly for signaling, line-carrying, and illumination. In most cases they are fired from a hand projector.

These items generally use a type of construction in which the head and rocket tube are integral. The rocket tube is filled with a propellant composition having a tapered, conical vent hole in its center to facilitate burning. The after end of the tube is constricted, or contains a plug of narrower diameter than the rest of the tube in order to concentrate the expanding propellant gases. The choke and a short length of the vent tube interior are coated with gunpowder to assist in igniton of the propellant.

Kite-Launching Rocket Mk II (Service)

Data

Over-all length .....10.25 in.
Maximum diameter ..... 1.25 in.

General: These rockets are used to enable kites to be raised easily from emergency dinghies. They are fired from a 1-in. signal pistol fitted with a barrel extension.

Description: The main rocket propellant compositon is contained in the case, the nose of which is closed by a wooden plug and a layer of clay. The after end of the case houses a plaster-of-paris choke, which is covered by a millboard washer and a paper disc. A conical vent in the rocket propellant is aligned with a hole through the choke. The end of the vent nearest the choke is coated with gunpowder priming.

The rocket is fixed in a bridle having a hinged stirrup, to which is attached a 2-ft. wire cable. During flight, the cable end nearest the rocket is protected from heat by an asbestos sheath. The free end of the cable carries a loop for connection with the kite tow-line.

The rocket is painted aluminum over-all, with manufacturing and filling information stencilled on the case in black letters.

Operation: When the pistol, loaded with rocket and cartridge, is fired, the flash from the cartridge ignites the gunpowder priming in the rocket, and the priming ignites the rocket propellant composition. The rocket travels upwards for a distance of about 200 ft. until the kite flying line is almost paid out. The kite-cover retaining pins, which are attached to the kite flying line, are then withdrawn. The kite opens automatically, and the kite cover falls away. The flying line then withdraws a sp pin connecting the rocket tow-line to the top of the kite, and the rocket is separated from the kite.

1-lb. Signal Rocket Mk III (Service)

Data

Over-all length .....16.4 in.
Maximum diameter .....1.8 in.
Total weight .....1 lb.
Color of stars .....White
Number of stars 28

General: This rocket is designed for day or night signalling.

Description: The components consist of a propellant-composition filled case, closed by a wooden plug, and an upper cylinder containing 28 white stars.

The case consists of a rolled paper tube choked near the lower end to form a vent and threaded below the choke to receive the wooden plug. The tube is filled with rocket-propellant compositon, the center of which has a conic cavity. A clay filling plug with a tapered hole in its center is located in the top of the tube,

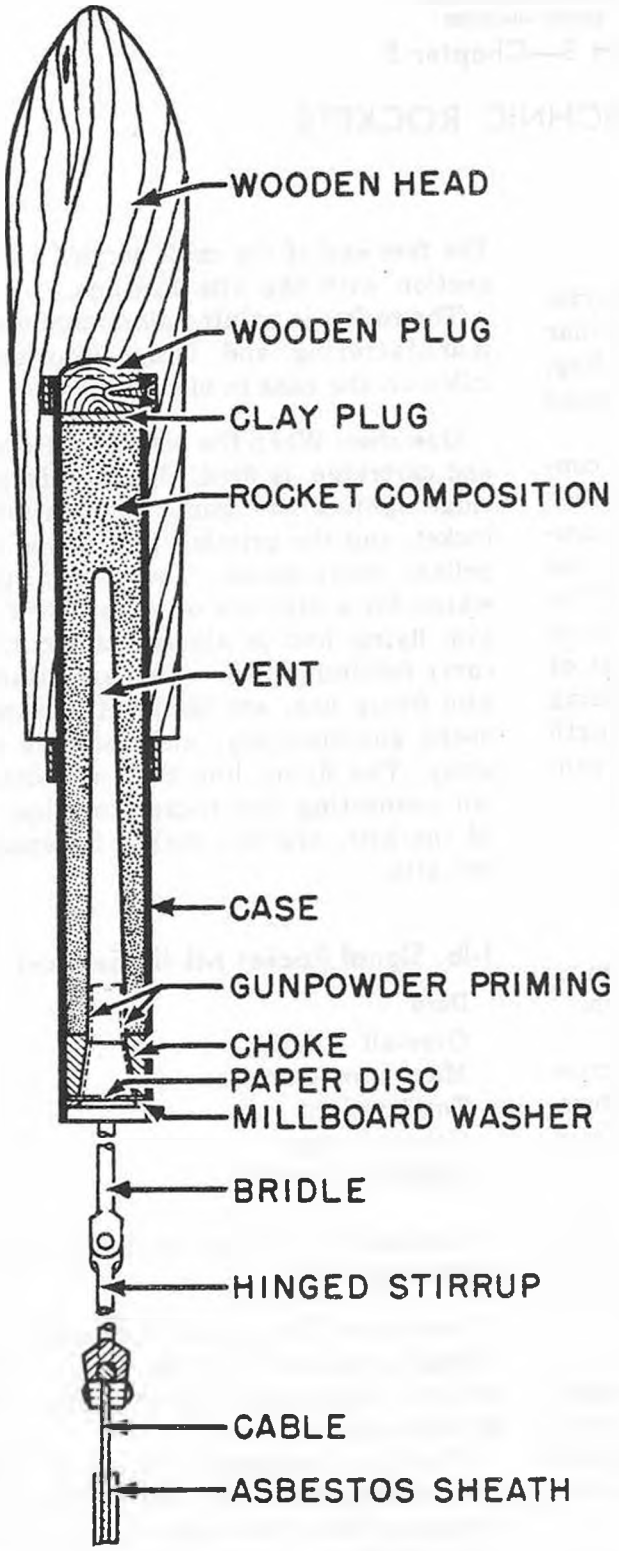


Figure 217—Buoyant Line-Carrying Rocket No. 2 Mk I

and the recess and the face of the clay are primed with mealed black powder. A small charge of rocket composition is dusted over the top face of the clay. A clay plug with a tapered hole is located immediately above the choke. The recess and the choke are primed with gunpowder. A metal socket for accommodating the stick is glued to the outside of the case, and also bound to it with twine.

The cylinder consists of a rolled paper tube filled with 28 white stars. It is closed at one end by a paper disc covered with a paper cone, and at the other end is attached to the case. The joints are sealed with paper strips.

The rocket is painted olive drab and carries a white instructional label around the case. Manufacturing and filling information is stenciled on the cylinder.

Operation: When the wooden plug is removed, the vent is exposed and the rocket is ignited by applying a lighted portfire to the vent. When the major part of the rocket composition has burned, combustion spreads through the cavity and primed hole in the clay filling to the rocket composition in the cylinder, and thereby ignites and ejects the stars. The burning stars are ejected at a height of about 900 ft. and burn for about nine seconds.

Buoyant Line-Carrying Rocket No. 2 Mk I (Service)

Data

Over-all length	28.0 in.
Maximum diameter	2.75 in.
Total weight	3.25 lb.

General: This rocket is fired from a hand-firing rocket projector, and is initiated by a 30-grain percussion cartridge. The rocket is designed for rescue purposes on marine craft and for use by airfields situated in coastal areas as a means of contacting crews of aircraft which have crashed into the sea immediately after take-off.

Description: The rocket consists of a wooden head made in two halves, held together with screws, which engage the head of the rocket tube. The rocket propellant compositon is contained in the tube, the nose end of which is closed by a wooden plug and a clay plug. The

after end of the rocket tube houses a plaster-of-paris choke, which is covered by a millboard washer and an oiled paper disc. A conical vent is formed in the rocket propellant composition in line with a tapered hole in the choke. The end of the vent nearest the choke and the hole in the choke are coated with gunpowder priming.

A bridle with a hinged stirrup is attached to the rocket, and a tail consisting of a wire cable about 3 ft. long is secured to the stirrup. The part of the tail nearest the rocket is protected from the heat of the burning rocket composition by an asbestos sheath. The free end of the tail carries a loop for connection to a buoyant line.

The buoyant line consists of 250 yd. of orange colored cotton cord, which is specially treated so that it will float on water. It is coiled in a square cardboard container whose lid is secured by adhesive tape.

The wooden head is painted yellow over-all, and filling and manufacturing information is stencilled on the head in black letters.

Operation: When the projector, loaded with rocket and cartridge, is fired, the flash from the cartridge ignites the gunpowder priming in the rocket and at the same time forces the rocket out of the projector. The gunpowder priming ignites the rocket composition, which then takes over and propels the rocket along its trajectory. The rocket draws the buoyant line out of its container, and, when expended, falls into the sea and floats on the surface.

3¾-lb. Illuminating Rocket No. 2 Mk I (Service)

Data

Over-all length	30 in.
Maximum diameter	2.25 in.
Total weight	3.75 lb.
Height of ejection	750 ft.
Burning time	45 seconds
Candlepower	180,000

General: This rocket is currently employed only by the Air/Sea Rescue Service to assist in sea rescue searches at night. It is fired from a hand-firing projector, and is initiated by a 30-grain percussion cartridge.

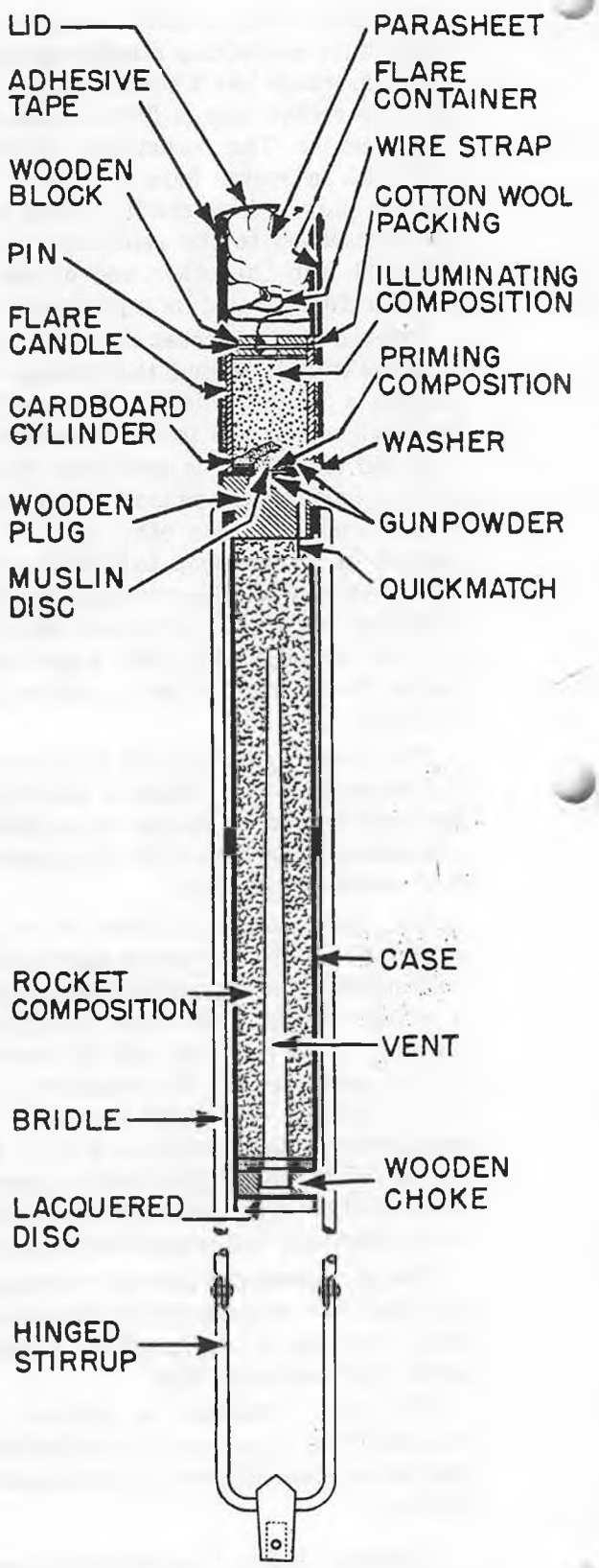


Figure 218—3¾-lb. Illuminating Rocket No. 2 Mk I

Description: The rocket consists of a steel rocket tube containing a rocket-propelling composition, which has a conical cavity in the center. The rocket tube is fitted at one end with a metal center. The rocket tube is fitted at one end with a metal flare container housing a wooden plug, a flare candle, and a cotton parasheet attached to the candle by a wire strap. Crimped into the other end of the tube is a wooden choke sealed by a paper disc.

Secured to the rocket tube is a steel bridle, which extends beyond the wooden choke and carries a hinged stirrup. One end of a steel rope tail is screwed to the base of the stirrup. The end of the tail is protected from the heat of the burning propellant composition by an asbestos sheath. The other end of the tail is spliced to form a loop to which is attached a 12-ft. hemp rope. The rope is coiled into a paper envelope, which has a cotton loop attached to it. The envelope, with the rope inside, is attached to the rocket by a rubber band when supplied.

The wooden plug in the flare container carries a recess which houses a small quantity of gunpowder and a length of quickmatch. The quickmatch contacts both the gunpowder and the rocket composition.

The flare candle consists of a cardboard cylinder held in place in the flare container with cotton-wool packing, and closed at one end by a wooden block. This block has a pin passing through it to take one end of the wire strap of the parasheet. At the other end of the cardboard cylinder is secured a washer, housing a gunpowder charge which is held in place by a muslin disc. Above this disc is placed a small amount of priming composition. An illuminating compositon fills the remainder of the candle.

The parasheet and the wire strap are packed into the flare container with packing cylinders, and the container is closed by a metal lid secured with adhesive tape.

The flare container is painted aluminum over-all. The filling and manufacturing information is stencilled on the container in black letters.

Operation: When the projector, loaded with rocket and cartridge, is fired, the explosion of the cartridge breaks the paper disc, and the flash passes through the choke and ignites the rocket-propellant composition. The gases generated by the composition then take over and force the rocket along its trajectory. When the rocket composition is almost burned through, it ignites the quickmatch. The flash from the quickmatch initiates the gunpowder in the wooden block. The flash from the gunpowder ignites the priming composition in the flare candle, which in turn fires the illuminating composition. Simultaneously, the pressure of the gases from the exploding gunpowder forces the lid from the flare container, and ejects the ignited candle and its attached parachute. The tail and the hemp rope act as flight stabilizers.

6¼-lb. Illuminating Rocket No. 1 Mk 1 (Service)

Data

Over-all length	22.5 in.
Maximum diameter	3.5 in.
Total weight	6.25 lb
Height of ejection	800 ft. (approx.)
Burning time	45 sec. (approx.)
Candle power	300,000

General: This rocket is currenty used by the Royal Observer Corps to indicate the presence of low-flying enemy aircraft to patrolling fighters, and by the Air/Sea Rescue Service to assist in sea rescue searches at night. The rocket is fired from a Type B Rocket Projector, Mk III or IV, using a 60-grain percussion cartridge.

Description: The rocket consists of a rocket tube, a slidng tail, and a flare container, which houses a burster charge, flare candle, and parachute. The rocket tube is filled with a rocket-propellant composition, having a conical cavity in the center, and is closed at one end by a gunmetal choke crimped in position. The choke is closed by a paper seal. At the other end of the rocket tube are a wooden block and a clay plug, with a hole to receive a length of quickmatch. The flare container is crimped to a metal junction head secured by screws to the wooden block. Housed in the junction head are a wooden washer, covered with primed cambric, and t burster charge, which is held in place by another wooden washer.

The flare candle consists of a rolled paper case, strengthened at one end by a tin-plate cup, and held in place by felt packing. The strengthened end of the case contains a fusible metal cup having a central hole. This cup houses a quantity of priming composition, which is held in place by a primed cambric disc and a paper washer. The main illuminating composition of the candle is held in place by a millboard disc. A suspension cup, riveted to the paper case, carries a piece of wire wrapped at both ends with adhesive tape. One end of a wire strap is looped around the middle of the wire. The other end of the wire strap is attached to a 36-in. parachute, which is packed into the flare container between a wooden washer, millboard spacers, and a wooden disc. The top of the flare container is closed by a metal lid secured in place with adhesive tape.

The sliding tail is of the drum type. When the rocket is fired, the tail slides along the rocket tube until arrested by the metal choke. A leaf spring attached to one of the tail fins then holds the tail in the extended positon.

The flare container is painted aluminum over-all, with filling and manufacturing information stencilled on the container in black letters.

Operation: When the projector, loaded with rocket and cartridge, is fired, the explosion of the cartridge breaks the paper seal on the rocket choke, and the flash passes through the choke to ignite the rocket-propellant composition. The gases generated by the burning propellant then carry the rocket along its trajectory. When the rocket composition is almost burned through, it ignites the quickmatch and the primed cambric, which in turn fires the burster charge. The flash from the burster charge ignites the flare candle and forces the lid from the flare container, ejecting the ignited candle and its attached parachute.

9-lb. Illuminating Rocket Mk II (Service)

Data

Over-all length	36 in.
Maximum diameter	6 in.
Weight	9 lb.
Height of ejection	1500 ft. (approx.)
Burning time	60-70 seconds
Candlepower	300,000

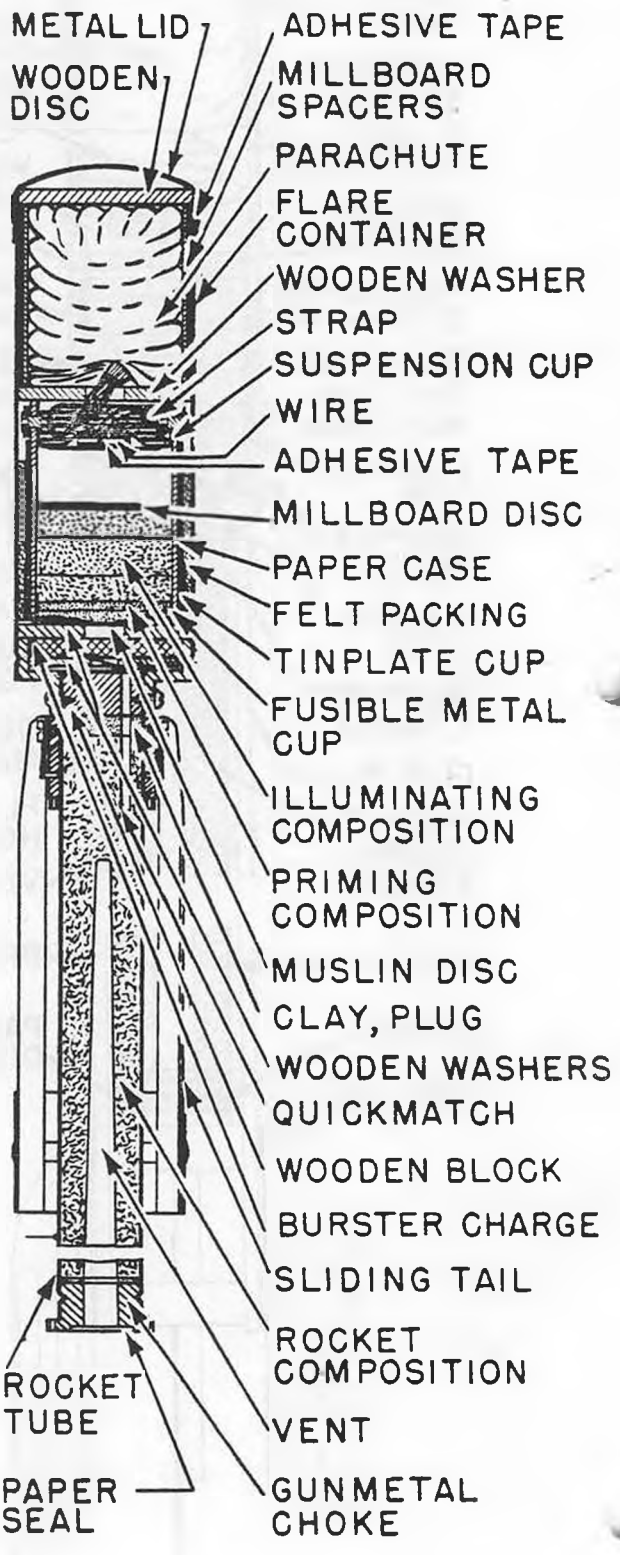


Figure 219—6¼-lb. Illuminating Rocket No 1 Mk I

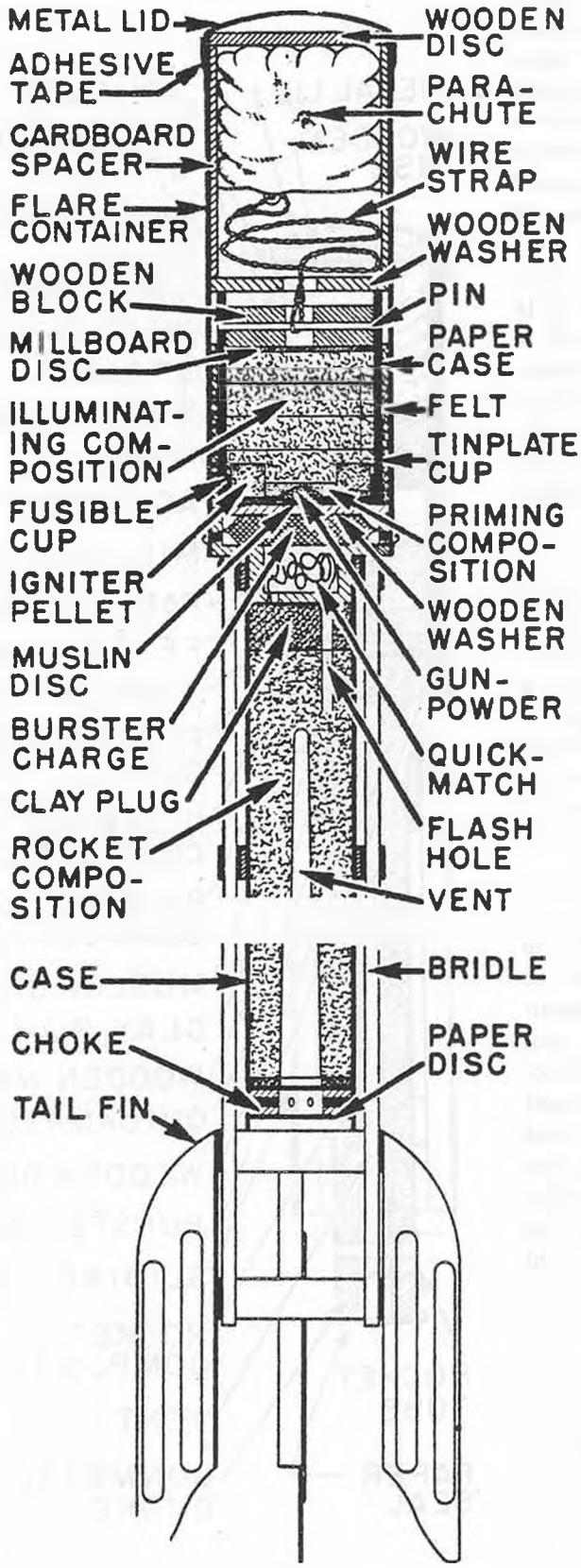


Figure 220—9-lb. Illuminating Rocket Mk II

General: This rocket is currently used only by the Royal Observer Corps to indicate to patrolling fighters the presence of low-flying enemy aircraft. The rocket is fired from a Type B Rocket Projector Mk IV, using a 60-grain percussion cartridge.

Description: The rocket consists of a steel rocket tube, a tail, and a metal flare container, which houses a parachute, flare candle, and burster charge. The rocket tube is filled with a propellant composition, with a conical cavity in the center. At one end of the rocket tube is a gun-metal choke crimped in position and closed with a paper disc.

At the other end of the steel tube is a clay plug provided with flash hole. The flare container is fastened with screws to a metal junction head, which houses the burster charge and a length of quickmatch. The burster charge is held in position by a wooden washer, covered with primed cambric. Attached to the flare container is a waterproof sleeve, which fits over the projector barrel to prevent rain from entering the barrel when the projector is loaded.

The flare candle consists of a rolled paper case, strengthened at one end by a tin-plate cap and held in place with felt packing. The strengthened end of the cap contains a fusible metal cup having a central hole. Housed in this cup are a quantity of gunpowder, priming composition, and two igniter pellets. The gunpowder and priming composition are held in place by a muslin disc.

The main illuminating filling of the candle is pressed in position and held in place by a millboard disc. A wooden block, resting on the millboard disc, has a central hole to receive one end of a wire strap, which is looped around a metal rod passing through the wooden block. The block is riveted to the paper case. The other end of the wire strap is attached to a 36-in. parachute, packed in the flare container between a wooden washer, cardboard spacers, and a wooden disc. The top of the flare container is closed by a metal lid secured to the container with adhesive tape.

The rocket is stabilized in flight by a tail secured to the rocket tube. The tail consists of four fins attached to a bridle, which is fitted to the rocket tube.

The flare container is painted aluminum overall, with filling and manufacturing information stencilled on the container in black letters.

Operation: When the projector, loaded with rocket and cartridge, is fired, the flash from the cartridge breaks the paper sealing disc, passes through the choke, and ignites the rocket propellant composition, which then forces the rocket along its trajectory. When the rocket composition is amost burned through, the flame passes through the flash hole and ignites the length of quickmatch and the burster charge. The flash from the burster charge ignites the flare candle and forces the lid from the flare container, ejecting the ignited candle and its attached parachute.

Part 4—ROCKET FUZES

Chapter 1

INTRODUCTION

General

Rocket fuzes are mechanical devices which initiate the explosive system of the rockets in which they are used. Rocket fuzes, as well as bomb fuzes, contain the more sensitive initiating explosives of the explosive system, such as detonators, boosters, etc. No counterpart of the bomb pistol is used in rockets.

Nose fuzing of rockets is more common than base fuzing, as is shown by the comparative number of nose and base fuzes. This tendency can be explained to some extent by again noting the British emphasis on antiaircraft rockets, which use impact, or aerial-burst, nose fuzes, and by the fact that the inherent delay in base fuzes, acting on an inertia principle, makes them most practical for employment in the less widely used S.A.P. rockets.

Designation

Rocket fuzes are designated in the same manner as bomb fuzes and pistols. A "Number", corresponding to the U.S. "Mark", and a "Mark", corresponding to the U.S. "Modification" and always expressed in Roman numerals, are used to designate a particular fuze. These numerical symbols are, of course, accompanied by the word "Fuze". Minor changes in marks are indicated by asterisks, capital letters, or lower-case letters.

Types of Fuzes

Rocket nose fuzes employ various types of action and arming. Instantaneous impact, instantaneous impact-self destroying, pyrotechnic-delay aerial burst, and mechanical-delay aerial burst are the common types of action. The Fuze No. 731 Mk I, also known as the Kealy fuze, is an interesting development of the use of electrical time setting in an attempt to eliminate "dead time".

Gas pressure arming and impact firing ar the main features of the rocket base fuzes discussed in this section.

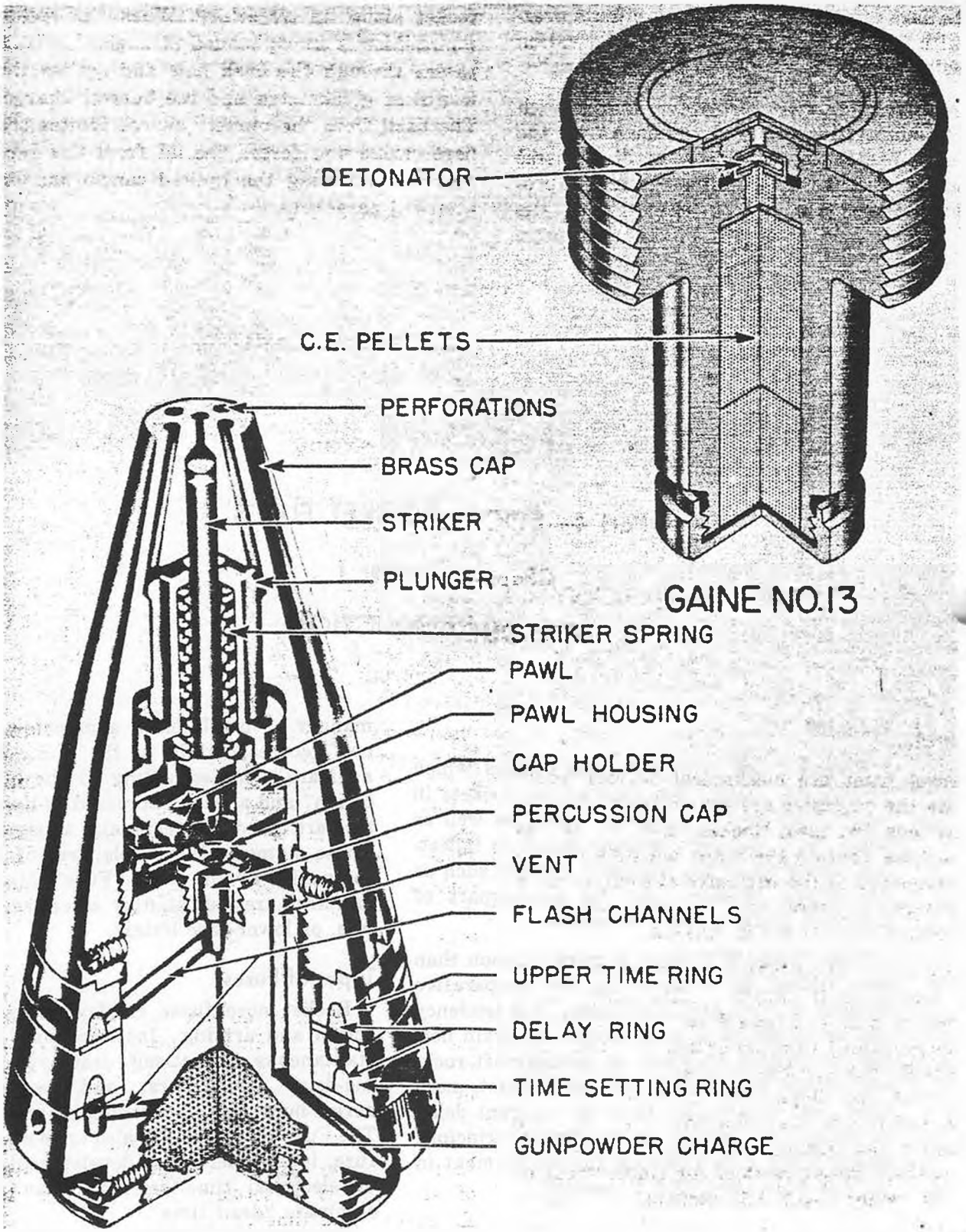


Figure 221—Nose Fuze No. 700 Mk II

ROCKET NOSE FUZES

Nose Fuze No. 700 Mks I and II (Service)

Data

Rockets used in—Shell, H.E., 3-in., No. 1 Mk I
Action .....Pyrotechnic aerial burst
Armed condition.....No external evidence
Arming time .....1.2 sec. (approx.)
Body diameter .....2.4 in.
Over-all length .....4.7 in.
Color .....Brass

Description: The Fuze Mk I consists of a brass fuze body, a brass cap, an upper time ring, and a lower time-setting ring.

The brass nose cap has a flat top with five perforations, the center one leading to the striker recess and the remaining four leading to the recess accommodating the plunger. In this nose cap are located the striker and the striker spring. The spring is enclosed in an aluminum alloy plunger. Supporting the striker and the plunger are two brass pawls, pivoted in a pawl housing which is screwed into the bottom of the nose cap.

Pivoted in a recess in the fuze body is a safety lever, the upper arm of which intervenes between the striker and the percussion cap in the unarmed position. The lower end of the lever is rectangular in cross section and fits into a spring-loaded catch. The outer end of the catch engages a recess in the time setting ring when the fuze is set on SAFE. A turning movement is imparted to the safety lever when the outer end of the catch leaves the recess in the time-setting ring, thus removing the upper lever arm from beneath the striker.

A flash channel leading to the upper time ring is located beneath the percussion cap. A second channel leads from the lower time-setting ring to the charge of gunpowder in the base of the fuze. Leading from the top of the fuze body through to the base of the fuze is a third channel provided for the escape of air pressure.

Operation: When the time-setting ring is moved from the safe position, the safety catch moves out of its recess and rotates the safety lever from under the striker.

During the acceleration period of the rocket, air enters the perforations in the top of the brass cap. The pressure built up inside the fuze forces the plunger down over the striker. The lower edge of the plunger, bearing on the outer end of the pawls, causes their inner ends to lift the striker and compress the striker spring. This movement continues until the inner ends of the pawls are rotated clear of the striker, which is then driven into the percussion cap, initiating the delay train in the upper time ring. This, in turn, ignites the delay train in the lower time-setting ring, which burns for the required period and then initiates the gunpowder charge in the base of the fuze. The explosion of the gunpowder charge initiates the Gaine No. 13, which is located in the adapter ring below the fuze.

Remarks: Fuze No. 700 Mk II is identical to the Fuze Mk I, except that the striker, pawls, and spring are somewhat modified, and the safety lever assembly is omitted.

The Fuzes Mk I and Mk II are pyrotechnic time fuzes, designed for antiaircraft purposes. Variable settings, from 0 to 30 seconds, are obtained by rotating the time-setting ring. The time settings are indicated by numbered graduations, subdivided into ¼-second intervals, engraved on the fuze body below the time-setting ring.

Nose Fuze No. 701 Mk I (Service)

Data

Rockets used in—Shell, H.E., 3-in., No. 2 Mk I
Action .....Pyrotechnic aerial burst
Armed condition.....No external evidence
Arming time.....1.2 seconds (approx.)
Body diameter .....2.4 in.

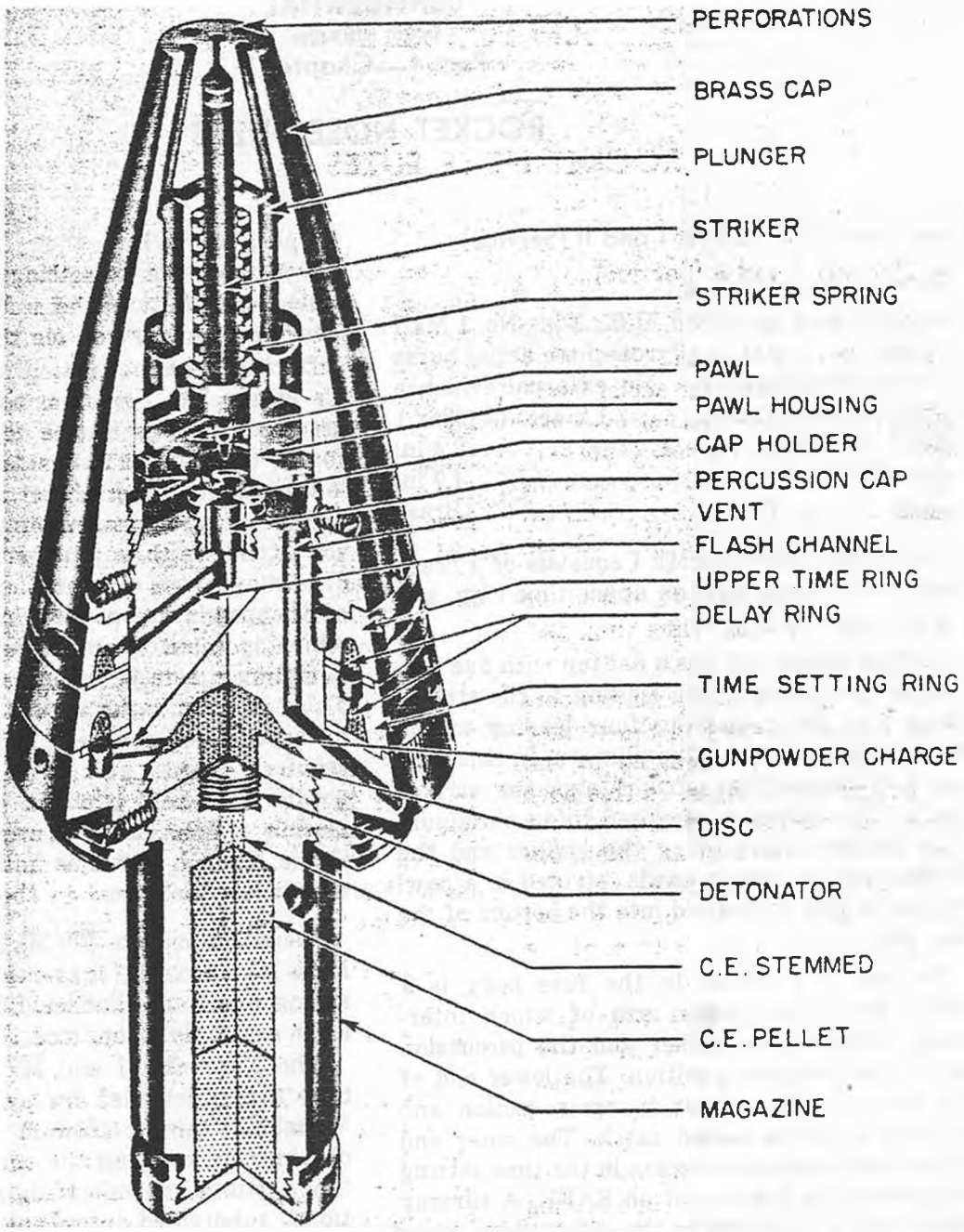


Figure 222—Nose Fuze No. 701 Mk I

Over-all length .....4.7 in.
Color .....Brass

Description: This fuze is almost identical to the Fuze No. 700 Mk II. Instead of employing Gaine No. 13, however, this fuze is fitted with a magazine containing two C.E. pellets, which is an integral part of the fuze assembly. This change is necessitated by the different shape of the light ogival shell in which the fuze is employed.

Operation: The operating sequence of this fuze is identical to that of the Fuze No. 700 Mk II.

Remarks: Although this fuze is classified as a service item, neither the fuze nor the shell which it was designed has ever been employed operationally.

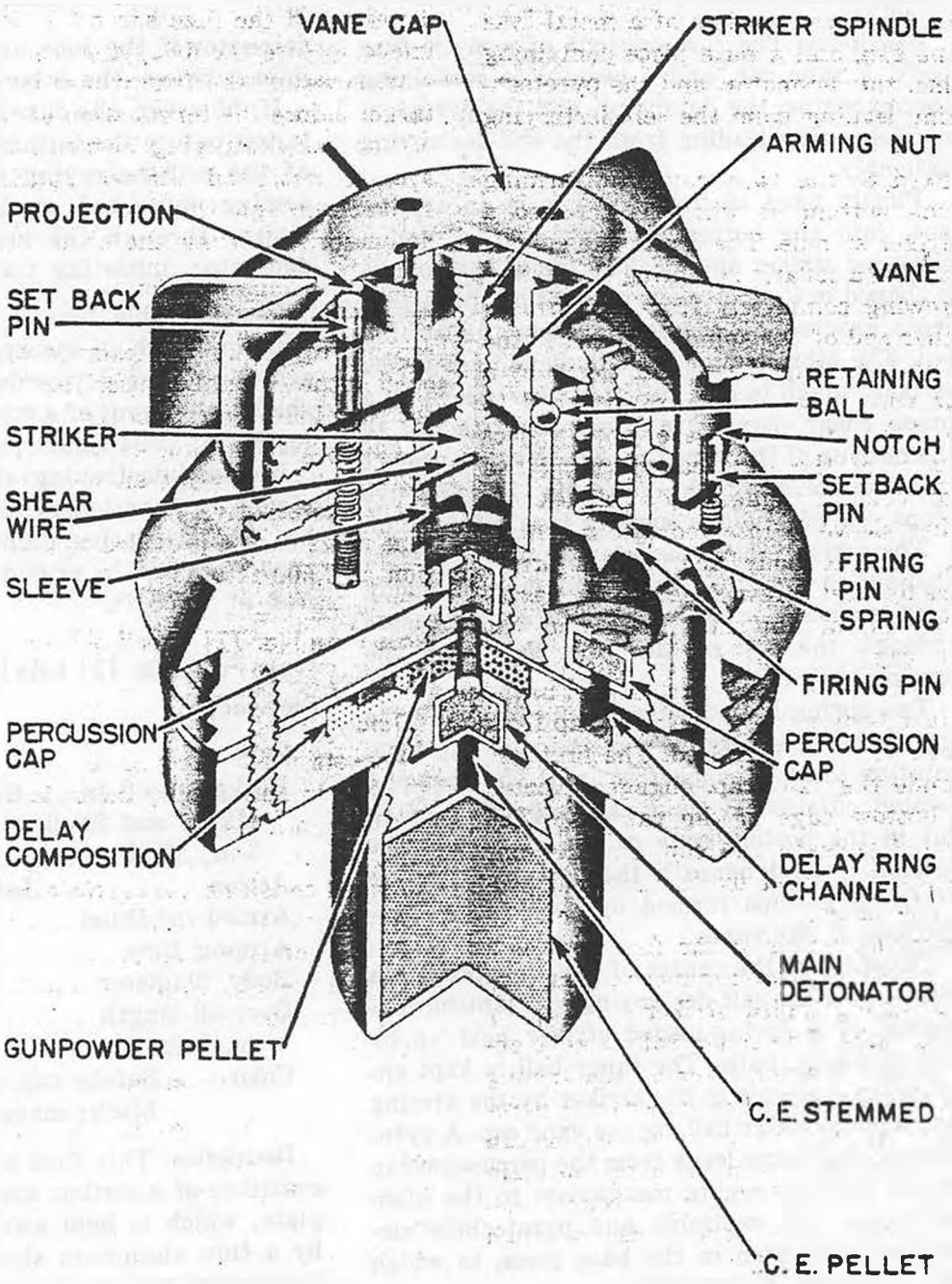


Figure 223—Nose Fuze No. 720 Mk IV

Nose Fuze No. 720 Mk IV (Service)

Data

Rockets used in.....Shell, H.E., 3-in., No. 2 Mk I (Air-to-Air), and Shell, H.E., 2-in., Mks I and II
Action.....Impact instantaneous self-destroying
Armed condition.....When safety pin is removed, and vane cup 0.2 in. above fuze head
Arming time .....5 vane revolutions
Body diameter .....2.1 in.
Vane span .....2.1 in.
Over-all length .....2.85 in.
Color.....Vanes, unpainted steel; body, green painted alloy; base, bronze lacquer brass

Description: The fuze consists of a metal fuze body, a vane cap, and a base piece containing the magazine, the detonator, and the pyrotechnic delay ring leading from the self-destroying assembly.

Firmly fixed to the vane cap is an arming nut, into the bottom of which is screwed a threaded striker spindle. The top of the spindle is shaped to form a collar, preventing the striker from unscrewing completely from the arming nut. The other end of the spindle is fixed to the striker, which is held in the striker sleeve by a brass shear wire. Five vanes are attached to the outside of the vane cap. These vanes project into the inside of the vane cap, forming five stops, one of which is engaged by a setback pin.

The striker sleeve is inserted into a central channel in the fuze body and is held firmly fixed in place by a set-screw. A safety pin passes through the top of the fuze body and the arming-vane cap.

Two spring-loaded setback pins located in the top of the fuze body prevent the vane cap from rotating until the rocket is fired. The first pin, located outside the vane cap, engages a notch cut in the bottom edge of the vane cap. The second, located beneath the cap, engages one of the five stops formed by the internal projections of the vanes.

Offset from the center of the fuze body is a channel for the self-destroying mechanism, consisting of a spring-loaded striker held up by two retaining balls. The inner ball is kept engaged in a groove in the striker by the arming nut, and the outer ball, by the vane cap. A pyrotechnic delay ring leads from the percussion cap of the self-destroying mechanism to the main detonator. All explosive and pyrotechnic elements are located in the base piece, to which the magazine is threaded.

Operation: The safety pin is removed manually before firing. During the acceleration period of the rocket, the two setback pins move back against their springs and disengage the vane cap, which is then allowed to rotate. As the vane cap rotates, the arming nut unscrews from the striker spindle. The vane cap and the arming nut no longer confine the retaining balls of the self-destroying device, and the balls move out, releasing the striker and initiating the delay ring. The delay ring burns out and fires the detonator if the fuze has not been initiated by impact before the delay elapses.

If, however, the fuze makes impact with the target before the termination of the delay time of the self-destroying element, the vane cap, arming nut, and striker spindle drive the striker through the shear wire and into the detonator, initiating the shell directly.

Remarks: This fuze is a direct-acting impact fuze in which is incorporated a spring-loaded self-destroying device designed to detonate the shell in the event of a miss. The fuze is designed for Naval antiaircraft purposes.

The self-destroying element is normally designed to function at an altitude of 4,500 ft., but an alternative filling composition for the time rings can be provided to give self-destruction at 7,500 ft.

Nose Fuze No. 721 Mks II, II*, and III (Service)

Data

Rockets used in....Shell, H.E., 3-in., 29-Mk I; and Shells, Incendiary and Smoke, 5-in., Mk I
Action .....Instantaneous on impact
Armed condition .....No external evidence
Arming time .....Instantaneous
Body diameter .....2.33 in.
Over-all length .....6.4 in. (with cap and magazine)
Color ....Safety cap, unpainted alloy; body, black; magazine, brass

Description: This fuze is a simple impact fuze consiting of a striker and an attached pressure plate, which is held away from the detonator by a thin aluminum shear wire. A safety cap is screwed over the head of the fuze, and the sides of the safety cap hold a safety clip in position beneath the pressure plate of the striker. The safety clip consists of two metal segments riveted one at each end of a short strip of spring steel.

The detonator is carried in a brass detonator holder screwed into the underside of the body. The channel in the bottom of the detonator holder is stemmed with C.E. Above the holder, interposed between the detonator and the striker, is a small brass retaining disc supported on a washer of similar material.

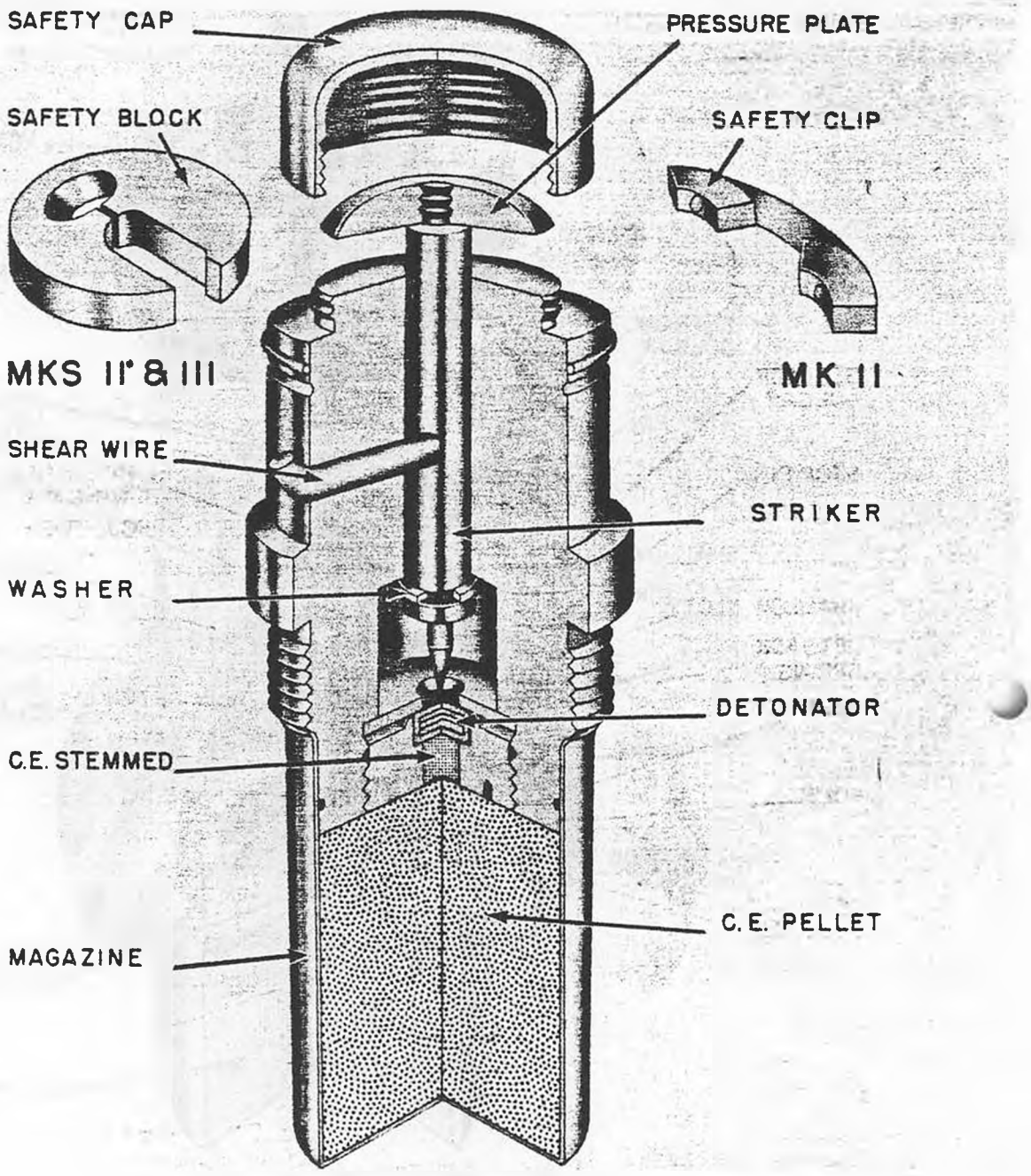


Figure 224—Nose Fuze No. 721

The magazine consists of a brass cup crimped to the body of the fuze.

Operation: Before firing, the safety cap is removed, and the safety clip is ejected. The safety cap is then replaced, insuring that the round will not fire on water impact. On impact with a hard surface, the safety cap is crushed, and the pressure plate drives the striker through the shear wire and into the detonator.

Remarks: Fuzes No. 721 Mks II* and III differ from the Mk II only in that a solid horseshoe-shaped metal safety block replaces the spring safety-clip assembly.

It should be noted that an unexploded round found with the safety cap in position is by no means to be considered safe, as the safety cap is replaced after the safety clip has been removed.

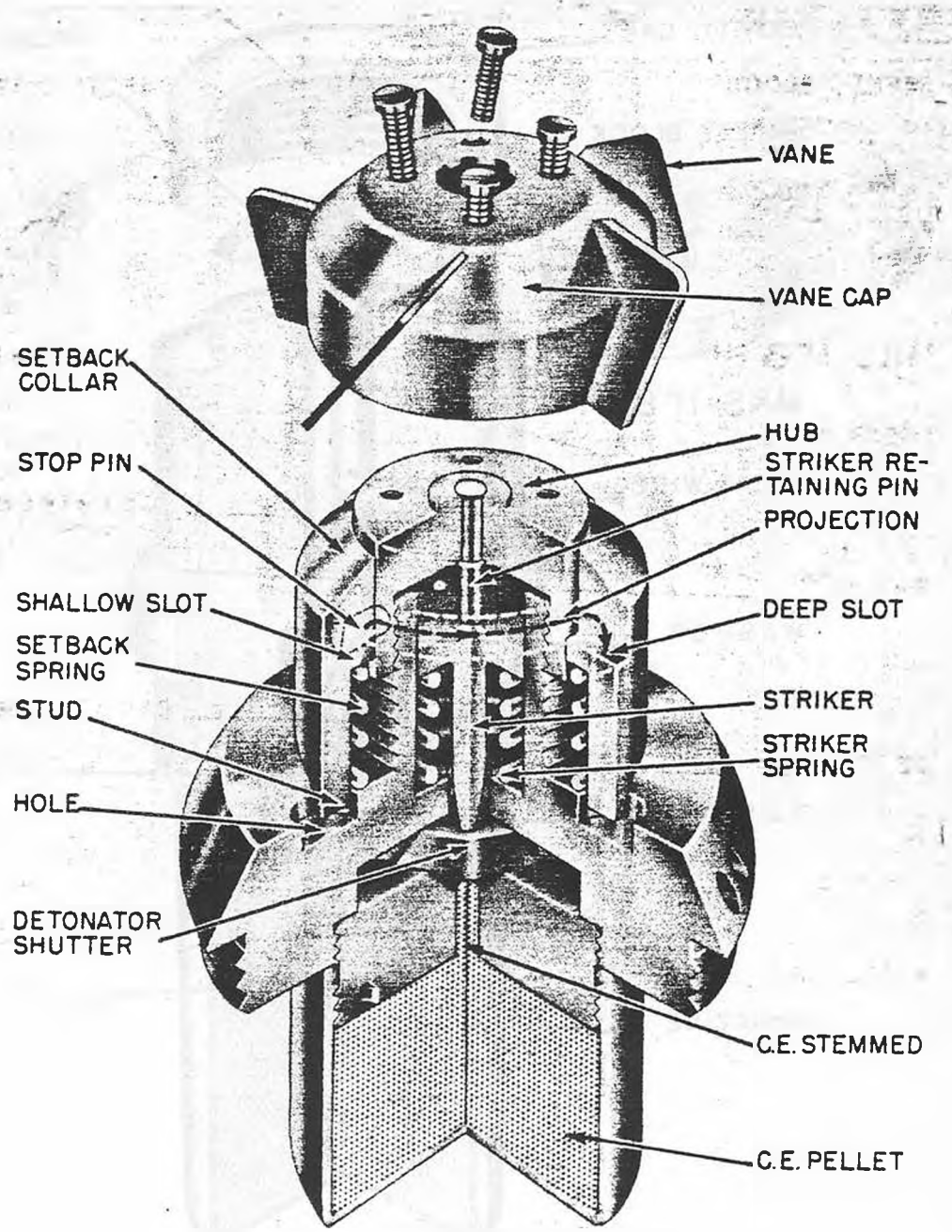


Figure 225—Nose Fuze No. 722 Mk III

Nose Fuze No. 722 Mk III (Service)

Data

Rockets used in.Shell, H.E., 5-in., 29-lb. Mk I
Action.....Instantaneous on impact
Armed condition ....When safety clip is removed, and vane cap and setback collar are missing
Arming time.....5½ to 6 vane revolutions
Body diameter .....2.14 in.
Over-all length .....2.96 in.
Vane span .....2.1 in.
Color ..... Vane cap, unpainted aluminum; body, bronze lacquered brass

Description: The fuze consists of a vane cap, fuze body, and magazine. The vane cap is fir attached to the vane cap hub, which is threaded

over a hollow projection on the top of the fuze body. Extending down from the center of the hub is a striker-retaining pin, which in the unarmed position, forces the striker downwards against its spring. Two small pins are located 180° apart on the outer edges of the hub. In the unarmed position these pins are engaged in two shallow slots in the setback collar.

The setback collar is a brass sleeve fitting around the vane hub and resting on the inertia spring. On the bottom edge of the collar are four studs, which engage in holes drilled in the top of the fuze body when the fuze is unarmed. The tapered top edge of the setback collar is cut away in two places to form two shallow slots and two deep slots, which are connected by a cut-down portion of the collar.

In the lower portion of the fuze body is located a shuttered detonator. This detonator is held offset in the unarmed position by the point of the striker. A magazine adapter is screwed into the bottom of the fuze body, and a thin metal magazine is screwed into the adapter.

Operation: When the rocket is fired, the setback collar moves down against its spring and disengages the stop pins on the hub from the shallow slots. The arming vanes then rotate through an arc of 45°, moving the hub around until its stop pins come up against the tapered edge of the setback collar. The fuze is held in this position until the expiration of the burning period of the rocket. At this time acceleration ceases, and the setback collar rises, allowing the stop pins on the hub to move into the deep slots in the collar. The collar is allowed to move up far enough to disengage the four studs from the holes in the fuze body. The vanes are now free to rotate both the hub and the setback collar through the remaining 5 or 5½ rotations necessary to arm the fuze. At this point the whole arming assembly falls clear of the fuze.

As the vane hub rises, the striker is forced upward by its spring, eventually removing the point of the striker from the detonator shutter. The shutter spring then aligns the detonator with the striker. On impact, the striker is driven down against its spring into the detonator, initiating the C.E. stemming in the stemmed disc, which in turn fires the C.E. pellet in the magazine.

Remarks: The fuze is fitted with a shipping safety clip (not illustrated), which engages in one of the two drilled holes in the outside of the fuze body and carries a stud which prevents rotation of the arming vanes. The clip is locked in place by a lead seal and is removed manually before the rocket is fired.

Nose Fuze No. 725 Mk I (Service)

Data

Rocket used in—Shell, H.E., 3-in. 29-lb. Mk I
Action.....Instantaneous on impact
Armed condition ..... No external evidence
Body diameter .....2.4 in.
Over-all length .....5.75 in.
Color.....Nose cap, brass; body, aluminum; shipping cap, black

Description: This fuze consists of an aluminum alloy fuze body with an ogival external contour. A thin brass cup is crimped over the forward end of the fuze body, which also is threaded to receive a black metal shipping cap. A C.E. booster is housed in a magazine, which threads into the base of the fuze.

A centrally located striker extends the full length of the fuze. A mushroom-shaped pressure plate is fixed to the top of the striker by a split pin. The lower end of the striker terminates in an integral firing pin, which extends into a blind hole in the detonator shutter, retaining the detonator in the offset position when the fuze is unarmed. A compressed spring separates the pressure plate from the forward end of the fuze body and tends to force the striker and plate upwards. This upward motion of the striker is prevented until after firing by a half-round rotary detent, which engages a slot cut in the striker spindle.

Rotation of the half-round detent is accomplished by an escapement-controlled arming mechanism. This mechanism is powered on setback by the rearward movement of a pivoted inertia block. Motion of the block causes the attached gear train to rotate the detent. Speed of arming is controlled through the escapement mechanism.

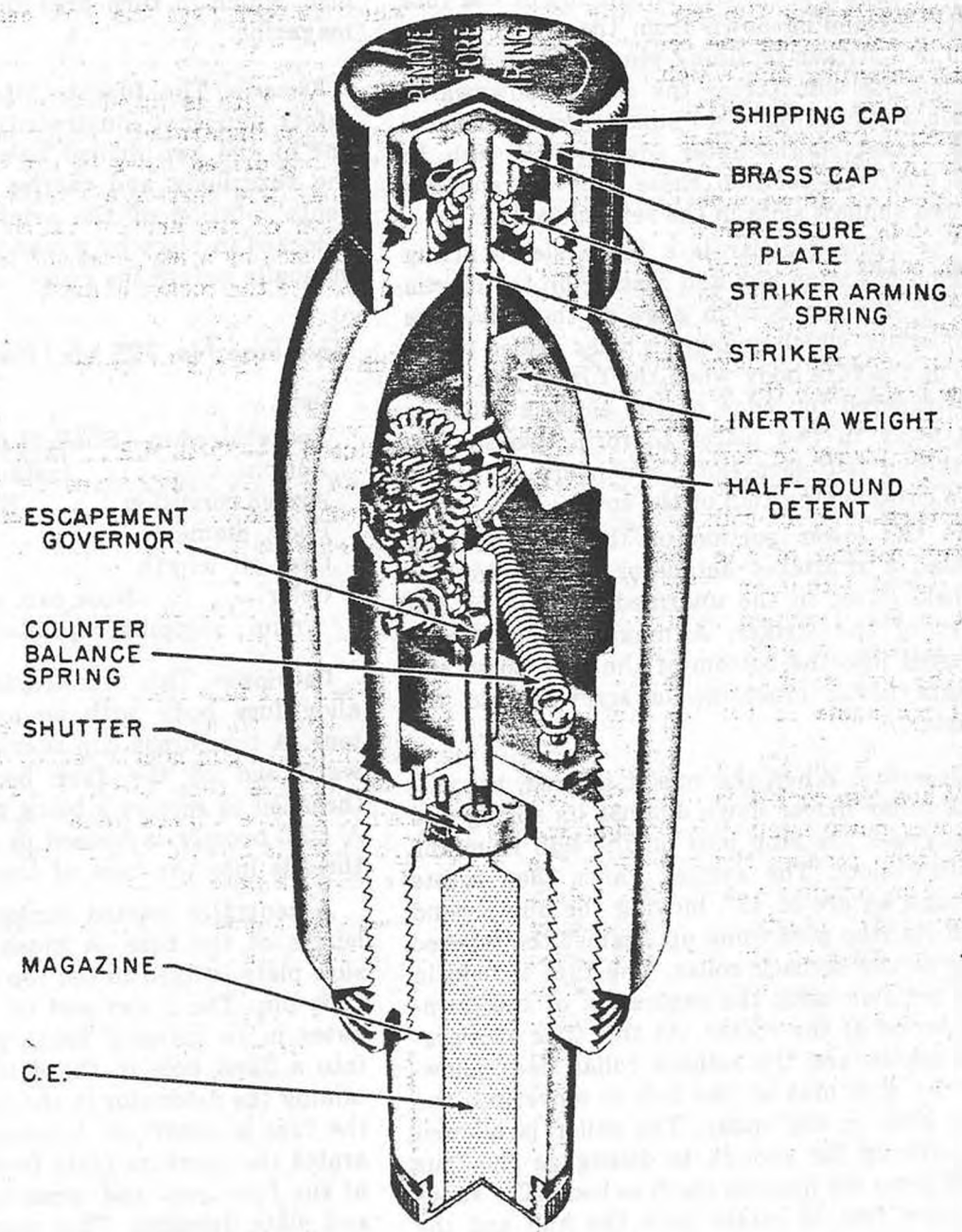


Figure 226—Nose Fuze No. 725 Mk I

Operation: Partial arming results during the setback or acceleration stage. The inertia block moves through an angle of about 60°, initiating the gear train, and rotating the detent through about 135°. When the inertia block has reached its aftermost position, the flat face of the detent is presented to the slot in the striker. The striker is now free to move upwards under force of the arming spring and free the detonator shutter, as soon as acceleration of the round ceases. When deceleration begins, the striker is moved upwards, the detonator aligned beneath the striker, and the fuze is fully armed.

The thin brass nose cap is crushed on impact, and the pressure plate and striker are forced down into the detonator, initiating the explosive train.

Remarks: This fuze was designed to replace the No. 721 Mks II* and III, when used in the "Land Mattress", but its use may be extended to include the 5-in. (H.E. Shell) "Sea Mattress", and the 60-lb. F. Shell, No. 1 Mk I for the 3-in. Aircraft Rocket.

Nose Fuze No. 731 Mk I (Service)

Data

Rockets used in—Shell, H.E., 3-in., No. 1 Mk I
Action.....Clockwork aerial burst; impact instantaneous
Armed conditions.....No external evidence
Arming time .....0.4 sec.
Body diameter .....3.25 in.
Over-all length .....8.1 in.
Color.....Black plastic, brass, and steel

General: This fuze, sometimes called the "Kealy" fuze, has been designed for use with rocket projectiles, particularly where a number of rounds are to be fired in salvos from multiple launchers. It is adapted for automatic setting on the launcher through the medium of electric impulses transmitted from a control point. Increase or decrease of the setting is rapidly applied at will. Setting of individual fuzes by hand may also be effected by means of a time ring on the fuze body, if necessary.

For automatic fuze setting, the launcher is fitted with two pairs of electric magnets for each set of rails, the pole pieces of the magnets extending to within ¼ inch of the outside of the rounds. One pair of magnets on each set of rails serves to increase the fuze set, and the other set to reduce it. The fuze incorporates two soft-iron cruciform armatures, so positioned that, when the round is loaded on the launcher, the ends of each armature are in close proximity to the poles of a magnet. The arrangement is such that an armature will undergo a partial rotation against the action of a spring, when an electric impulse passes through the coils of the proximate electric magnet, and will be returned by the spring at the end of the current pulse. Each oscillation causes movement of a ratchet mechanism associated with the armatures, and changes the fuze setting by one-half second.

No mechanical connection exists between the fuze and the launcher. The setting is effected by the magnetic flux passing from the pole pieces of the magnets, through the intervening air gap and fuze casing, to actuate the armatures. To ensure correct positioning of the armatures with respect to the electro-magnet poles when the round is loaded on the launcher, an external mark is provided on the fuze, which must be aligned with one of the tail fins on assembly.

Timing is effected by a clockwork train and escapement, which is ordinarily prevented from running by a spring-loaded detent capable of setting back on projection. The rate of retraction of the detent is so controlled by the escapement that an acceleration sustained for about 0.4 second must be applied before the fuze will arm. When the detent has completed the setback movement, it allows a spring-loaded shutter to move and uncover the detonator, and at the same time locks the detent in position.

When the fuze is set on SAFE, the detent is locked, the detonator is moved out of the path of the striker, and any automatic setting which may have been applied is cancelled. In addition, with the time ring moved beyond the AUTO position for manual setting, any automatic setting is cancelled and the automatic gear put out of action.

The percussion element will fire on impact with relatively light structures such as are encountered in aircraft.

Description: The base of the fuze receives the boss of the gaine, which is held in position with screws. The latter may be loosened to permit alignment of the fuze with the round for automatic setting on the launcher. The base carries the detonator shutter, which is provided with lugs bearing on the surfaces of the projections on the time ring. When the fuze is set on SAFE, the lower lug bears on the lower portion of the projection. Movement of the ring to the AUTO position causes the lower portion of the projection to clear the lower lug and bring the upper portion into contact with the upper lug, rotating the shutter until the detonator is in line with the axis of the fuze beneath the striker. Simultaneously, the lobe of the shutter moves out of the path of the arming detent, thereby allowing the fuze to arm on projection.

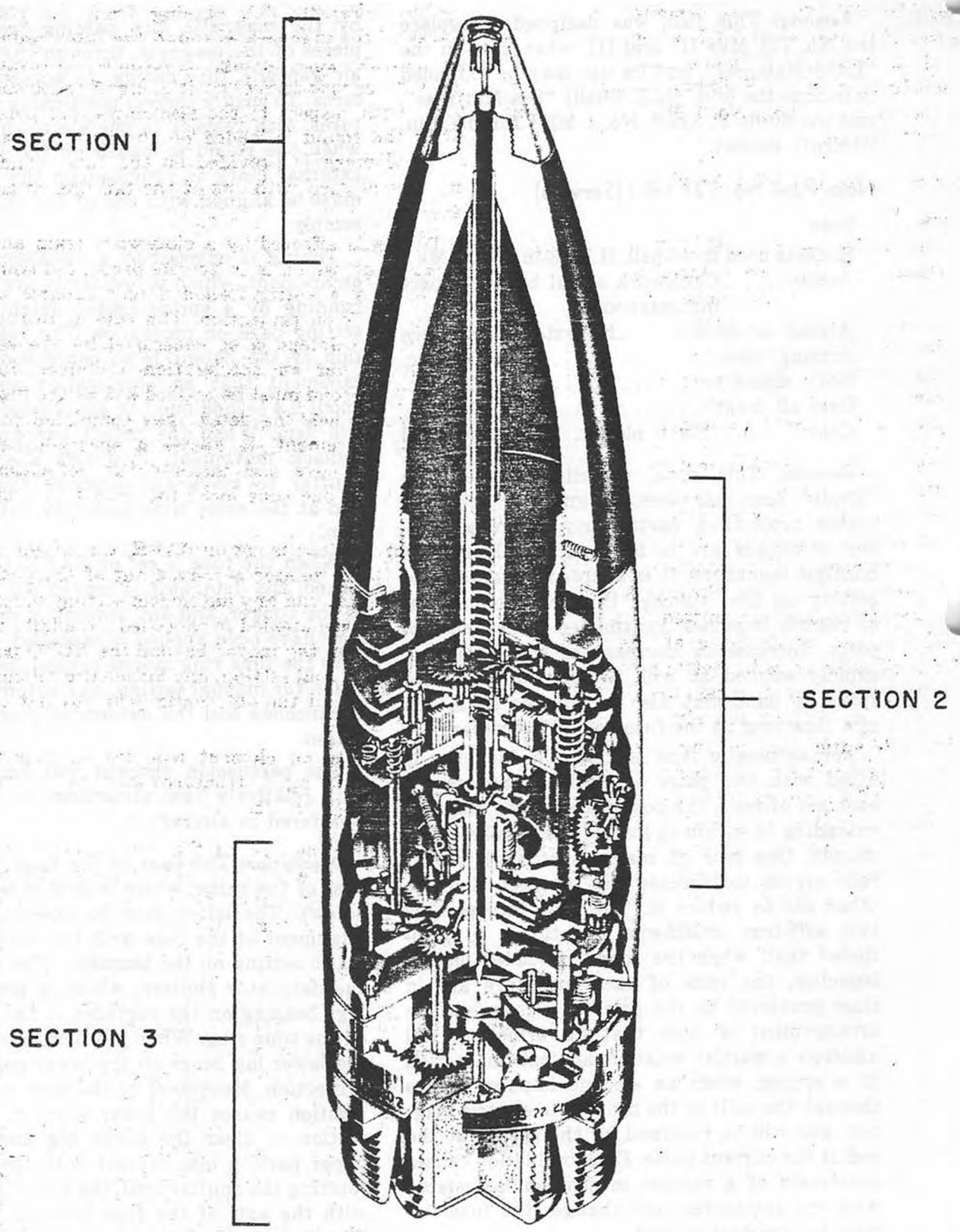
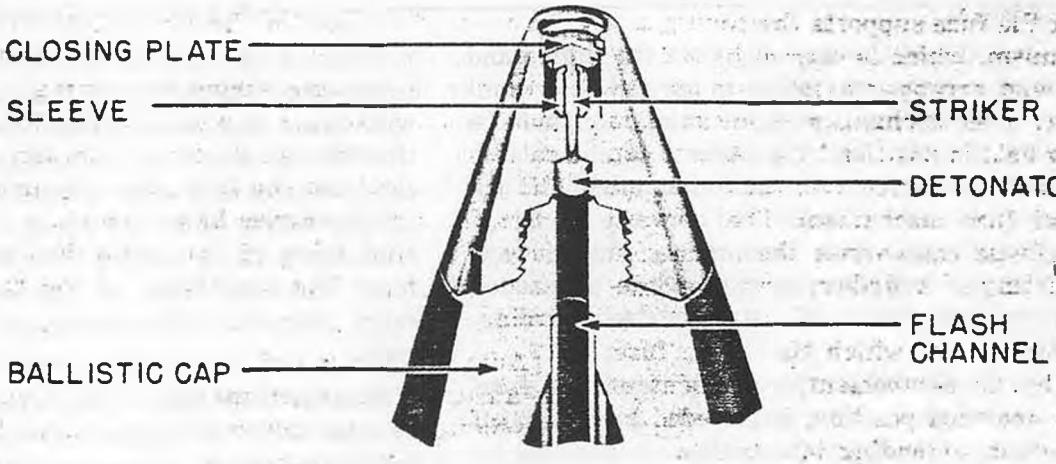
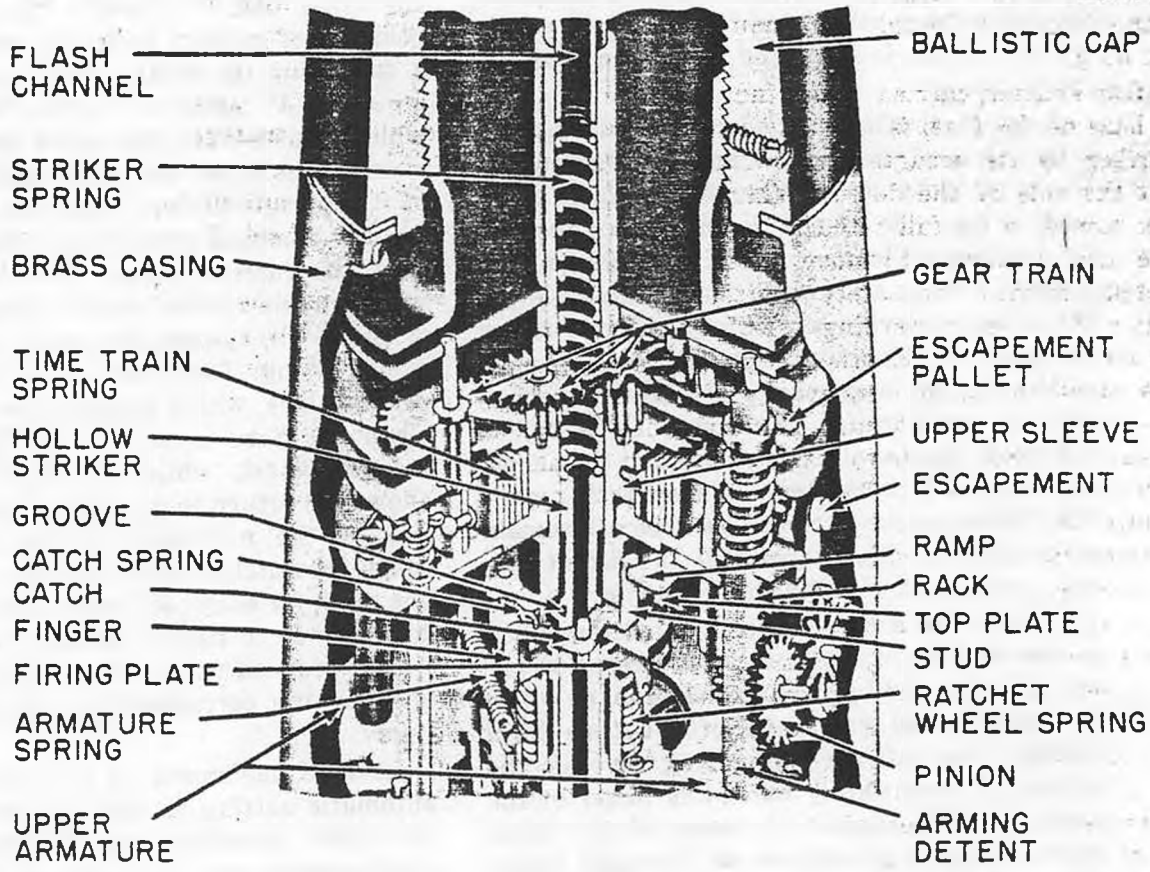


Figure 227—Nose Fuze No. 731 Mk I



SECTION 1



SECTION 2

Figure 228—Sectional enlargements of Nose Fuze No. 731 Mk 1

The base of the fuze supports the timing and release mechanism, which is carried by a number of plates and arranged axially around the hollow striker. The mechanism is enclosed in a brass casing held in position by a ballistic cap of bakelite, which is screwed over the top flange of the internal fuze mechanism. The forward end of the ballistic cap carries the percussion element, consisting of a striker, sleeve, and detonator.

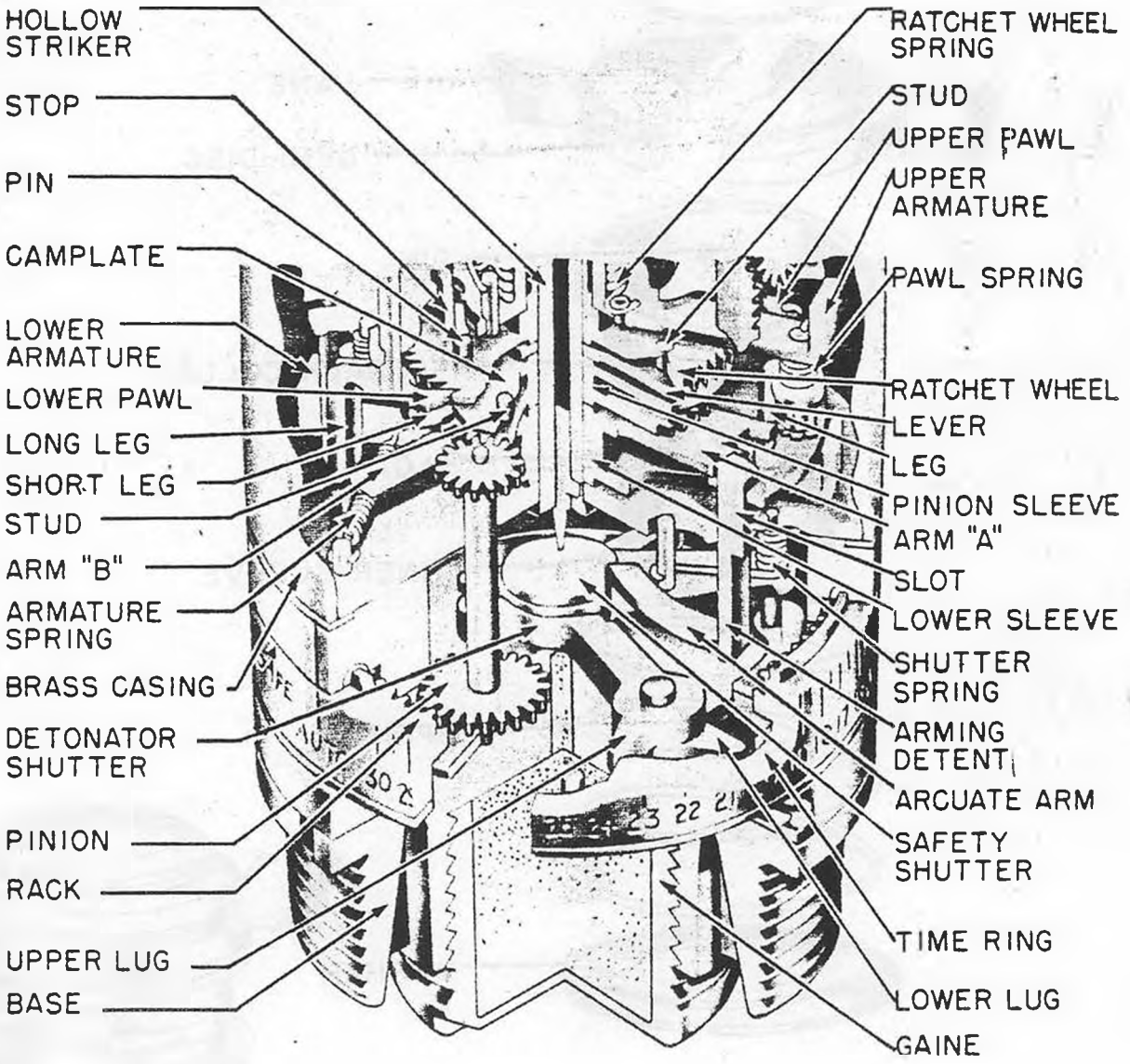
The clockwork train, which times the fuze, is controlled by an escapement, movement of which, in the unarmed position, is impeded by the arming detent, extending into the path of the pallet arm. The arming detent is removed from the pallet on setback, starting the clockwork. Rate of movement of the detent is governed by a gear train, and escapement through the medium of a pinion engaging on a rack on the edge of the detent. This control is such that displacement is completed in about 0.4 seconds when the fuze is subjected to a mean acceleration of 60 g.

A safety shutter, carried on a spindle pivoted in the base of the fuze, is normally held under the striker by its arcuate arm, which bears against the side of the detent. When the latter has moved to its full setback position, the arcuate arm is allowed to move into a slot in the detent, moving the safety shutter, under the action of the shutter spring, out of the path of the striker, and locking the detent in position. A small initial movement of the detent suffices to release the pallet arm and thus allow the clockwork timing train to start with a minimum delay on projection. The fuze will remain safe until full displacement of the detent permits movement of the arming shutter.

The striker is held cocked against the action of the striker spring by a catch pivoted on the top plate carried by the upper sleeve, to which is attached the inner end of the time train spring. The catch engages a groove in the striker. A downwardly extending finger of the catch, resting against the edge of the firing plate, prevents movement of the catch under action of the catch spring, and release of the striker, until movement of the timing train brings the finger into a position adjacent to the slot in the firing plate. The time of release of the striker is thus determined by the initial position of the slot in the firing plate relative to the catch finger. Since contact of the finger with the firing plate during the setting operation would introduce undesirable friction, the catch is provided with a stud which serves to lift the finger from the firing plate by initially engaging a ramp carried by a fixed plate of the fuze. The stud rides off the ramp during the early stages of the movement of the timing train.

Automatic setting of the fuze is accomplished by a pair of iron cruciform armatures, arranged for limited rotary movement in opposite directions under the influence of magnetic impulses against the action of the armature springs. The upper armature carries a spindle of an upper pawl, tending to be forced by the pawl spring into contact with the ratchet wheel. The ratchet wheel is carried on the same sleeve that carries the firing plate. Normally, the upper pawl is held out of contact with the ratchet wheel by a depending leg on the pawl, abutting against an arm "A" attached to the lower sleeve, to which is also fixed the lower armature. Movement of the upper armature against the action of its spring will first break the contact of the leg and arm and permit the upper pawl to engage the ratchet wheel. Continued movement will turn the ratchet wheel through a distance of one tooth, against the action of the ratchet-wheel spring. The lower pawl, having two depending legs, which engages the ratchet wheel when the fuze is set on AUTO, retains the ratchet wheel, while the upper armature is allowed to return to its original position. Repetition of the movement of the armature will cause the ratchet wheel to move a distance of one tooth for each oscillation, and, as each tooth corresponds to half a second, the fuze setting will be reduced from the maximum of 30.5 seconds by the corresponding number of oscillations.

Reverse movement of the ratchet wheel in automatic setting is effected by oscillation of the lower armature and its attached sleeve, which carries arm "A" and arm "B". Movement of arm "A" releases the upper pawl, which then bears on the ratchet wheel halfway between two teeth, while movement of arm "B" serves to lift the lower pawl away from the ratchet wheel through the medium of the leg. The arms



SECTION 3

Figure 229—Sectional enlargement of Nose Fuze No. 731 Mk I

"A" and "B" are so designed that the upper pawl bears on the ratchet wheel before the lower pawl is lifted. The ratchet wheel is thus allowed to move back the distance of half a tooth under the action of its spring. When the lower armature is allowed to return, the lower pawl first engages the ratchet and then the upper pawl is raised, thereby permitting the ratchet wheel to move backward a further distance of half a tooth. Thus each oscillation of the lower armature results in backward movement of the ratchet wheel to the extent of one tooth, and consequently results in an increase of half a second in the fuze setting.

It will be noted that when the fuze time ring is moved to the AUTO position for automatic setting, the short leg of the lower pawl then rests in a cut-away portion or recess of the ca— plate, and the lower pawl bears on the ratch— wheel. However, when the time ring is moved

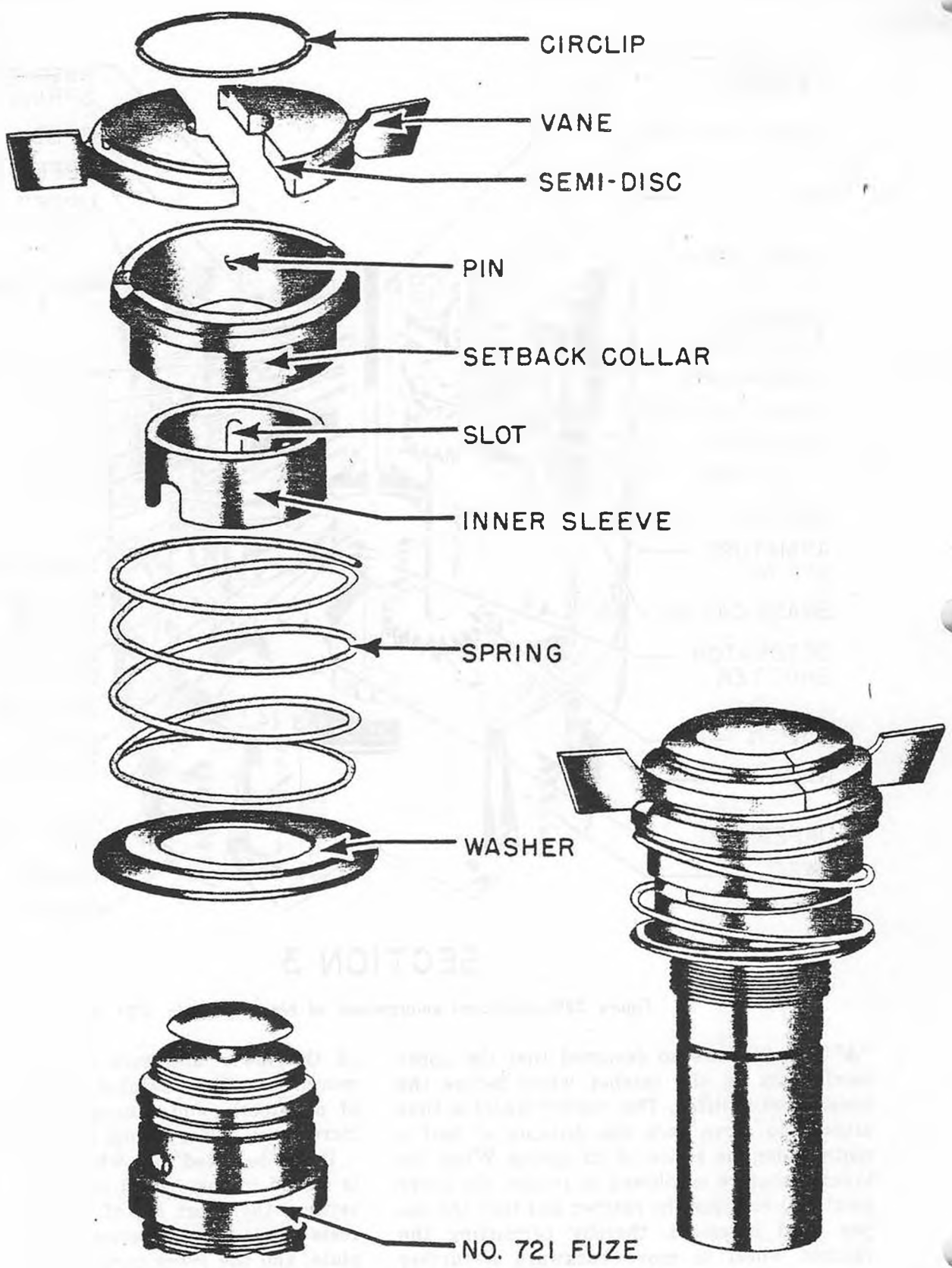


Figure 230—Nose Fuze No. 899 Mk I

to the SAFE or the manual setting, the short leg will ride in the outer edge of the cam plate, and the lower pawl will be out of contact with the ratchet wheel. The latter will then be free to return under action of its spring, thus cancelling any setting given by automatic means.

Manual setting of the fuze is effected by movement of the time ring, which is graduated in half-seconds from 0 to 30. The time ring carries an internal gear, which meshes with a pinion assembly to rotate a pinion, its associated pinion sleeve, and the cam plate. The latter has an upwardly extending stud, which is adapted to engage a lever mounted for free movement about the axis of the fuze. The ratchet wheel is provided with a similar stud extending downwards into the path of the lever. Movement of the time ring will cause counter-clockwise movement of the cam plate until the short leg of the lower pawl rises from the recess of the cam plate, raising the lower pawl from the ratchet wheel. The ratchet-wheel spring then returns the ratchet wheel to the maximum setting, in which position the pin on the ratchet wheel bears on the stop, and the cam-plate stud forces the lever into contact with the ratchet-wheel stud. Further movement of the timing ring will cause the ratchet wheel and its associated firing plate to move as one with the cam plate.

Functioning of the fuze on impact is caused by operation of a striker and detonator arranged in the nose cap. The striker is held by a metal cup designed to collapse under about 150 lb. pressure. The upper end of the striker bears on the closing plate. On impact the plate forces the striker into the detonator, crushing the cup. The flash from the detonator passes down the central tube and through the hollow striker. If the fuze is armed, the shuttered detonator will be set off by the blast. If the fuze is not armed, the lower detonator will be sealed off by the safety shutter.

Nose Fuze No. 899 Mk I (Service)

Data

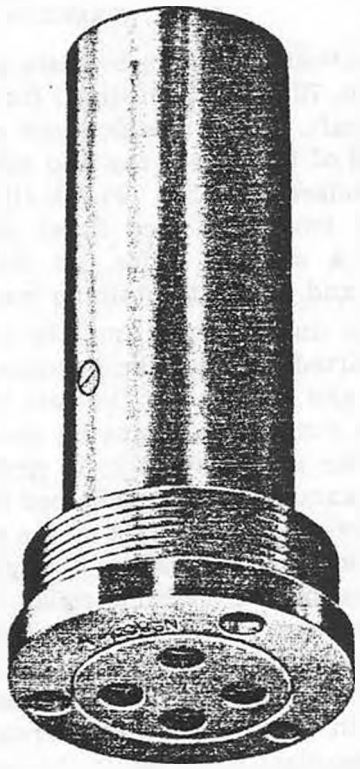
Rockets used in.....Shell, H.E., 60-lb., F., No. Mk I
Action.....Instantaneous on impact
Armed condition.....When vanes and semi-discs are missing
Arming time .....0.6 to 0.8 sec.
Body diameter .....2.33 in.
Over-all length .....5.9 in.
Color.....Vanes, unpainted alloy; body, black; magazine, brass

Description: This fuze consists of the Rocket Fuze No. 721 Mk III modified for safe carriage on aircraft. These modifications consist of the removal of the safety cap and safety clip from the standard Fuze No. 721 Mk III and the addition of two semi-discs fitted with vanes, a circlip, a setback collar, an inner sleeve, a spring, and a spring-retaining washer.

In the unarmed position, the two semi-discs are inserted between the pressure plate of the striker and the head of the fuze body, preventing the striker from moving downwards. The semi-discs are retained by a circlip which fits into an annular groove machined around the top of the two discs. Rotation of the vanes and the semi-discs is prevented by two grooves on the top edge of the setback collar in which the vanes engage. A pin, located inside the setback collar rides in a slot cut in the inner sleeve, preventing the collar from rotating. The inner sleeve, in turn, is prevented from rotating by its engagement with the protruding ends of the shear wire of the fuze. The setback collar is held in the raised position by the inertia spring, which is retained by the spring-retaining washer.

Operation: When the rocket is projected from the aircraft, the setback collar rides down against the action of the inertia spring. The semi-discs are thus disengaged from the setback collar, and are free to be rotated by the attached vanes. When the rotational speed of the semi-discs reaches about 3000 r.p.m., the centrifugal force thus created overcomes the restraint of the circlip, and the two semi-discs fly free of the fuze.

Impact with the target causes the pressure plate to force the striker through the aluminum shear wire into the detonator, firing the magazine and exploding the shell.



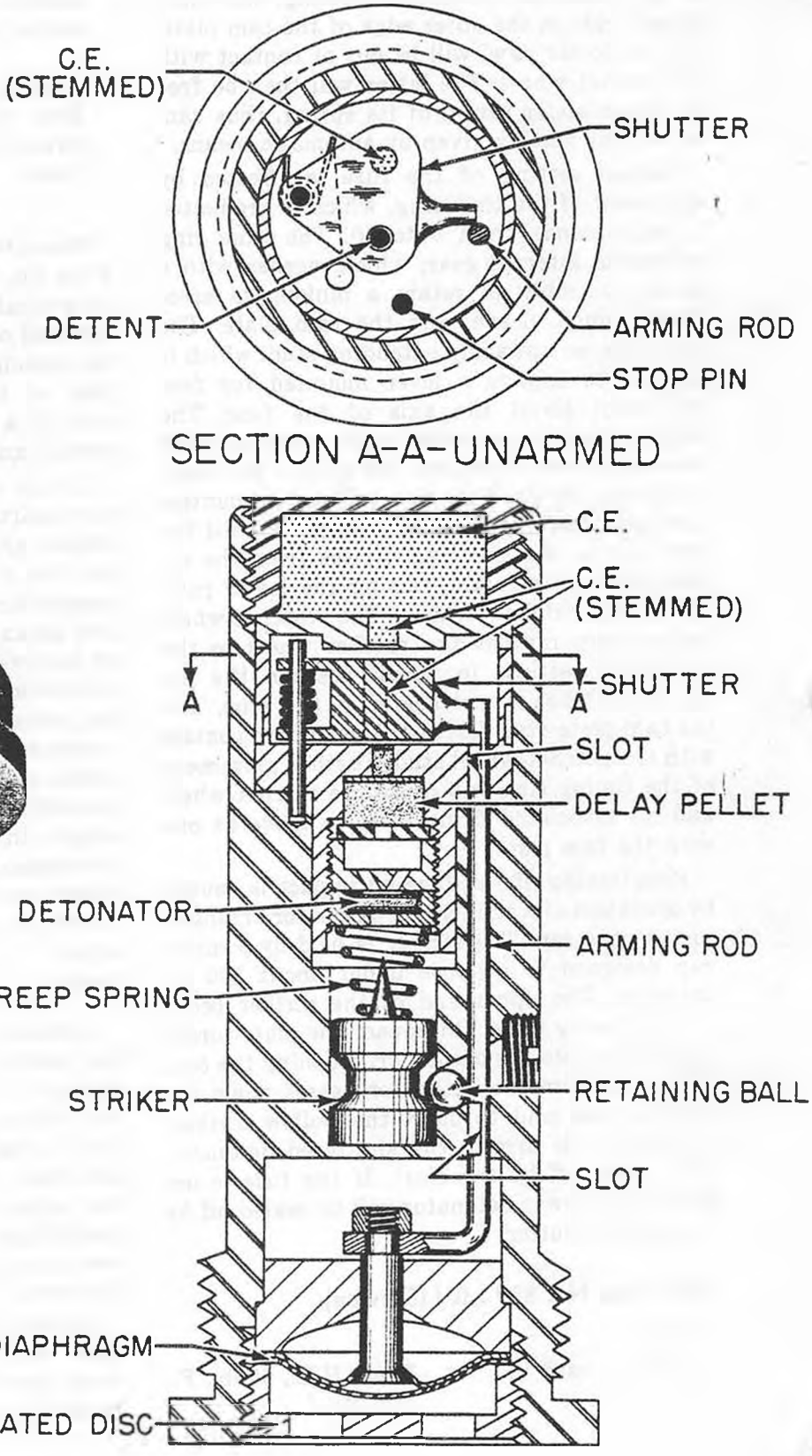


Figure 231—Base Fuze No. 865 Mk I

Part 4—Chapter 3

ROCKET BASE FUZES

Base Fuzes No. 865 Mk I, No. 878 Mk I, and No. 297 Mk I (Service)

Data

Rockets used in....No. 865 and No. 878 in Shell, H.E., 60-lb., S.A.P., No. 2 Mk I; No. 297 in Shell, H.E.,21-lb., S.A.P., No. 5 Mk I, or Shell, H.E., 60-lb., S.A.P., No. 6 Mk I
Action.....No. 865 and No. 297—Delay on impact; No. 878—Instantaneous on impact
Armed condition.....No external evidence
Body diameter .....2 in.
Over-all length .....4.3 in.
Color .....Unpainted brass

Description: These fuzes are identical except that the No. 865 and the No. 297 incorporate a delay element, whereas the No. 878 is instantaneous. The No. 865 and the No. 297 differ only in the length of delay used. These fuzes are base detonating fuzes, armed by gas pressure from the thermal unit, which is ignited by the rocket motor.

The fuze consists of a cylindrical brass housing, closed at one end by a perforated brass plug, and at the other end by a magazine cup containing a booster charge of C.E. Immediately beneath the perforated brass cup is located a metal diaphragm, to which is attached a long arming rod. This arming rod runs through a channel drilled off-center through the fuze body. In a central chamber in the fuze body are located a pointed striker and creep spring. In the unarmed position, this striker is held away from the detonator by a retaining ball, which engages an annular groove in the striker and a hole in the fuze body. The ball is held engaged in the striker by the arming rod.

Beneath the striker is located a detonator containing about two grams of Composition A or A1 mixture, a delay pellet of G. 20 gunpowder (in the No. 865 and No. 297), a second detonator of lead azide, and a C.E. detonator lead-out. Beneath the lead-out is located a shutter containing a booster lead-in of C.E. In the unarmed position, this lead-in is offset, and the explosive channel is sealed off by the metal body of the shutter. In the armed position, however, the stemmed C.E. channel in the shutter is aligned with the rest of the explosive train, forming a direct line to the booster charge in the magazine. The shutter is held offset in the unarmed position by the lower part of the arming rod. Two notches are cut in the arming rod, allowing passage to the shutter and clearance for the retaining ball when the fuze is armed.

The fuze is armed by the pressure of gases generated by the combustion of gunpowder in the thermal initiator, which is used in conjunction with the fuze. The initiator is p tioned in the base of the shell adapter; and when the shell is threaded into the shell ring of the motor, the initiator is brought closely against the front obturator of the motor.

The initiator consists of a thin steel base, adjacent to which is a septum containing L.D.N.R. composition. Above the septum is a chamber containing a charge of G. 20 gunpowder confined by a cardboard disc, which is held in position by a metal disc with a central hole. The heat from the burning propellant is conducted through the head obturator in the motor and the base of the initiator to the L.D.N.R. composition, which is ignited by the rise in temperature. The L.D.N.R. composition in turn initiates the G. 20 gunpowder, and the pressure produced reverses the diaphragm of the fuze and arms the fuze.

Operation: Depression of the diaphragm by the explosion of the thermal initiator moves the arming rod forward until the two notches in the rod are adjacent to the retaining ball and the pin on the lead-in shutter. The shutter is then aligned by its spring with the rest the explosive train, and the retaining ball is

allowed clearance to move out of engagement with the striker.

On impact, the striker rides forward against its spring and strikes the detonator, which fires the delay pellet (in the No. 865), which in turn fires the secondary detonator, lead-out, lead-in, and booster.

Remarks: The explosive train in the No. 878 is identical to that of the No. 865, except that the delay pellet is removed. The Fuze No. 297, used in the shells for the 3-in. Lilo assault rocket, is identical to the Fuze No. 865, except for the length of the delay time.

Part 5—HAND AND RIFLE GRENADES

Chapter 1

INTRODUCTION

General

The various types of grenades used by the British are the anti-personnel, anti-tank, smoke, illuminating, and incendiary grenades. The individual grenades are generally hand thrown, rifle projected, or, in some cases, may be either hand thrown or rifle projected.

The British armed forces use anti-personnel grenades of both the offensive and the defensive types. Anti-tank grenades vary widely in principle and construction, and sometimes incorporate a cavity charge to achieve greater penetration. Smoke grenades are of simple construction, and employ a white phosphorus charge, a burning smoke composition, or a combination of the two to produce a heavy smoke screen. The rifle illuminating grenades consist of a basically similar series of grenades, which vary mainly as regards to filling. The single incendiary bomb in this section is not designated as a grenade, but is included because of its similarity and use.

Grenades are commonly initiated by firing mechanisms resembling the Bouchon type igniter, by all-ways action fuzes, or by integral striker assemblies. Special items are equipped for special initiation, such as the Grenade No. 76, which is ignited by reaction of its contents, when exposed to air, or the Grenade No. 75, which employs two separate chemical igniters to initiate its explosive train.

Designation

Grenades generally follow the usual British system of designation. They are identified by a "Number", corresponding to the U. S. Navy "Mark", and a Roman numeral "Mark", corresponding to the U. S. Navy "Modification." Recent issues have the mark written in Arabic numerals.

Color and Markings

Grenade bodies are usually painted a solid color to indicate their use, as follows:

Anti-personnel	Black
Anti-tank	Buff
Smoke	Green
Illuminating	Buff
Incendiary	Red

There are some departures from this listing, but it can be followed as a general rule.

A red band, generally located near the top of an H. E. grenade, indicates that the grenade is filled. A ring of red crosses signifies that the filling is suitable for tropical storage. The type of filling is identified by a colored band or bands around the center of the grenade body. The abbreviation of the filling is stencilled on this band.

Each grenade has the grenade designation stamped, cast, or stencilled on the body. In addition, the manufacturer's initial or symbol, and the month or year of manufacture are also shown. When the grenade is filled, the initials or symbol of the filling depot, the type of filling, date of filling, and filling lot number are stencilled on the grenade body.

In some cases, special markings may supplement or replace the standard markings.

Firing Mechanisms

One type firing mechanisms commonly used to initiate British grenades, is similar in principle and operation to the Bouchon type igniter used in U. S. grenades. These striker mechanisms employ a fly-off safety lever which is retained until use by a safety pin, a pivoted, spring-loaded striker retained by the safety lever, a percussion cap, a safety fuse delay, and a detonator. The detonator is a separate u

which is inserted into the grenade beneath the striker mechanism shortly before using. The several striker mechanisms which are in use differ from one another mainly in the shape of the body or safety lever, material of construction, or color of the safety lever.

The striker mechanisms used in smoke grenades filled with a smoke composition do not have a detonator. The composition is ignited by a piece of primed cambric and priming composition, which are initiated by the delay fuse. W.P. filled grenades employ detonators to burst the container and expose the filling to the action of the air.

Many grenades employ specialized igniters and fuzes, which are peculiar to them.

Fuze No. 247

The Fuze No. 247 is an "all-ways" action fuze commonly used in a number of British grenades. The Fuze No. 247 Mk I has a body which is closed at one end by a closing cap and has a flash channel at the opposite end. A striker creep spring, cap pellet, and a lead ball are located inside the fuze body. The striker has a concave head, into which the ball fits, and a split striker point.

The creep spring separates the striker and cap pellet. A safety pin is inserted through the fuze body and the striker body, and has a length of fabric tape with a lead weight on the end fastened to its head. A plastic cap fits over the fuze body to hold the tape and weight in place.

The Fuze No. 247 Mk II differs from the Mk I in that it has a single point on the striker, and uses a more powerful detonator, instead of a percussion cap, in the cap pellet. The No. III is the same as the No. II, except that the closing cap is cast in one piece with the body, and is closed instead by a plug in its base. Different lengths of tape are used to change the arming times of the fuze.

The Fuzes Mk I and Mk II are obsolete and will not be used for future issues.

The Fuze No. 247 is very sensitive when armed, and should be handled accordingly if encountered in this condition.

ANTI-PERSONNEL GRENADES

A./P. Rifle or Hand Grenade No. 36M Mk I (Obsolete)

Data

Over-all length .....4 in.
Diameter .....2.4 in.
Total weight.....1 lb. 11¼ oz. (approx.)
Filling ..... Baratol
Delay.....4 seconds for hand grenades; 7 seconds for rifle grenades
Color .... Black
Markings.....Green band around center; red band or crosses around top

Description: This grenade consists of a lemon-shaped, cast-iron body filled with high explosive. The body has three holes in it; one in the base for priming, one near the top for filling, and one on the top through which the striker protrudes. The body is serrated and relatively thick, so as to give good fragmentation. A center piece, containing a striker and spring, a primer delay train, and a detonator, is located within the body and surrounded by cast explosive.

The striker is held up and the striker spring is held cocked by a lever which fits into a slot in the top of the striker. The lever is secured by a safety pin passing over it and through holes in two shoulders, which project on the outside of the body. The lever is shaped wi

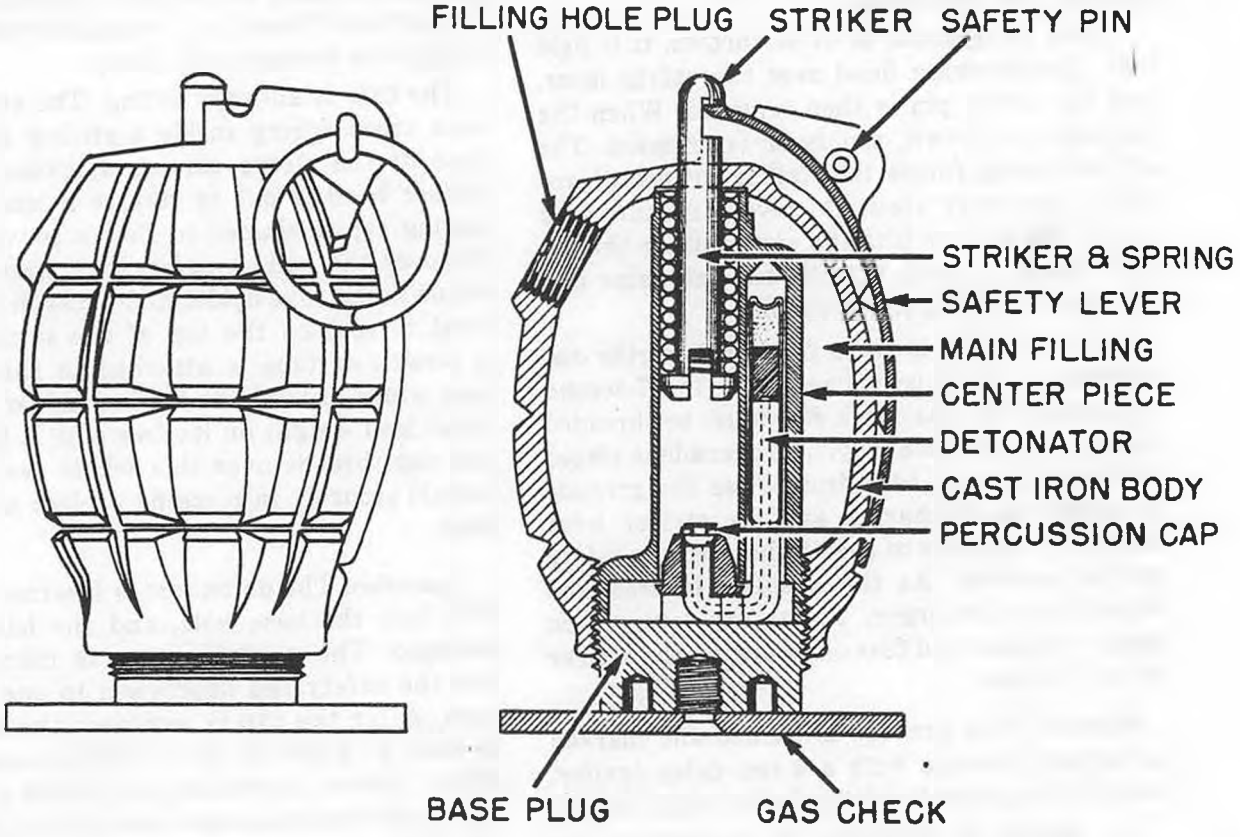


Figure 232—A./P. Rifle or Hand Grenade No. 36M Mk I

two small projections, which fit into notches in these shoulders to provide a pivot. The lever projects down the side of the grenade body, matching the body contour. The filling hole is closed by a screw plug. The base plug threads into the base opening and is itself threaded to receive a 2.5-in. diameter metal gas check disc for use when the grenade is fired from the rifle projector.

The igniter consists of a primer cap, a short length of safety fuse, and a detonator. The Igniters Mk V and Mk VI, which differ only in the composition of the safety fuse, incorporate a 4-sec. delay for use with hand grenades. These igniters can be identified by the white safety fuse employed. The Igniters Mk II and Mk III incorporate a 7-sec. delay for use with rifle grenades. They can be identified by the yellow safety fuse used, and the fact that the detonator body of the Mk II is copper, while that of the Mk III is aluminum.

Operation: Priming consists of removing the base plug, inserting the igniter set, and replacing the base plug.

When the grenade is to be thrown, it is held with the throwing hand over the safety lever, and the safety pin is then removed. When the grenade is thrown, the lever is released. The striker spring forces the striker downward, rotating the lever about its pivot and throwing it off. The striker hits the cap igniting the delay, which, in turn, sets off the detonator and the main filling of the grenade.

If the grenade is to be fired from a rifle discharger, it must be primed with the 7-second igniter and the gas check disc must be threaded tightly into the base plug. The grenade is placed in the discharger, base first. When the grenade is inside the discharger and the striker lever is held by the sides of the discharger, the safety pin is removed. As the grenade is fired and leaves the discharger, the safety lever is no longer retained and flies off, allowing the striker to hit the cap.

Remarks: This grenade is packed and marked as a hand grenade with a 4-sec. delay igniter, or as a rifle grenade with a 7-sec. delay igniter.

No weight of explosive is specified, as the grenade is filled to capacity.

A./P. Hand Grenade No. 69 Mk I (Obsolete)

Data

Over-all length	5½ in.
Diameter	2⅜ in.
Total weight	13 oz.
Filling	Amatol 80/20, Lyddite, or Baratol 20/80
Filling weight	3¼ oz.
Fuze	No. 247 Mk I, II, or III
Delay	None
Color	Black
Markings	The grenade has a band of red X's on the upper body, and a colored filling band around the base section.

Description: This grenade is a light, impact-firing grenade for offensive action. The body is made of bakelite. The area of burst is very limited, and it can, therefore, be thrown while standing in the open. The two-piece body threads together in the middle. There are a filling hole and plug and a priming hole and plug in the base section. The bakelite holder for the fuze threads into a large indentation in top section. There is a detonator well running lengthwise through the filling.

The fuze is all-ways acting. The striker rests on a creep spring inside a striker sleeve. The base of the sleeve carries a primer cap. The striker head is cut to receive a lead ball. The closing cap is shaped so that a convex surface fits over the ball. A safety pin passes through a hole in the fuze holder and beneath the striker head to rest on the top of the striker sleeve. A length of tape is attached to this pin. The tape winds around the striker holder and has a small lead weight on its free end. A light bakelite cap threads over this whole assembly and is held securely in place by a piece of adhesive tape.

Operation: The detonator is inserted open end first into the base hole, and the base plug is replaced. The adhesive tape is then removed and the safety cap unscrewed in one half of a turn. After the cap is removed, the tape must be held in place by the forefinger and thumb. When thrown, the weight on the end of the tape causes the tape to unwind and pull out the safety pin. Only the creep spring is now holding the striker away from the primer cap. On impact

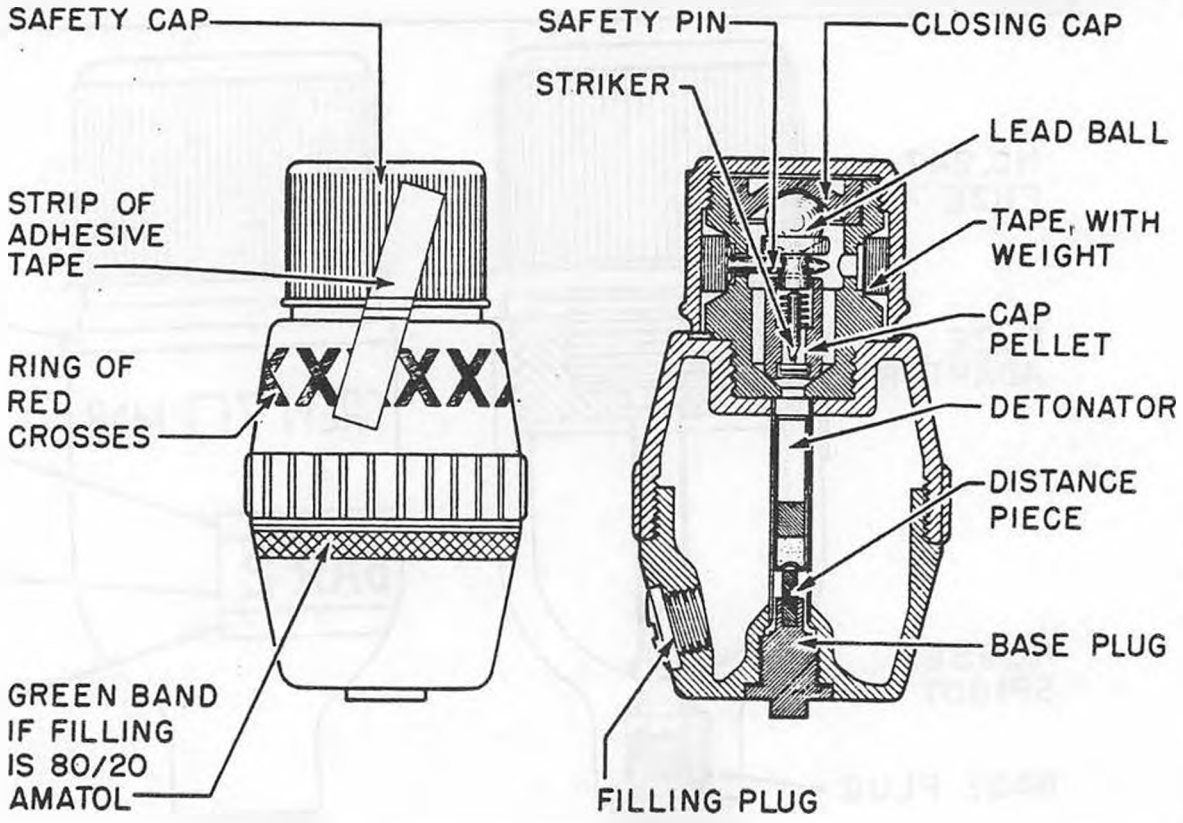


Figure 233—A./P. Hand Grenade No. 69 Mk I

the striker is forced into the primer cap, which initiates the detonator and explodes the grenade.

Remarks: Once the tape has unwound and the safety pin is free of the striker, the grenade is in a very sensitive condition and should be carefully disposed of.

A./P. Hand Grenades No. 70 Mk I (Obsolete), Mk II (Obsolescent), and III (Service), and No. 71 (Obsolete)

Data

Over-all length .....4½ in.
Diameter .....1¾ in.
Total weight .....1 lb.
Filling....Mk II, Baratol or Amatol; Mk III, RDX/TNT
Fuzing.....No. 247 Mk I, II, or III
Delay ..... None
Markings....Body is banded near the top in red and semibanded near the middle with two yellow bands separated by a green band.

Description: The Grenade Mk II consists of a cast-iron body, a fuze adapter, a base plug with a rubber spigot, and a filling-plug hole. The body is cup-shaped and threaded internally at the top to accommodate a fuze adapter. It is closed at the bottom by a threaded base plug to which is cemented a spigot. A rubber washer is interposed between the plug and the body. The adapter of zinc-base alloy is threaded internally to house a D.A. Percussion Fuze No. 247, Mk III, and is formed with a central perforation to position an aluminum detonator tube. A rubber washer is positioned between the fuze and the body. The filling hole in the side of the body is closed by means of a molding plug and a rubber washer. The body contains a filling of Baratol or Amatol.

The Grenade Mk III differs from the Mk II in that the filling hole and the thickening of the case at that point have been completely eliminated, and the Anatol or Baratol filling has been replaced by RDX/TNT 50/50, with C.E. pellet.

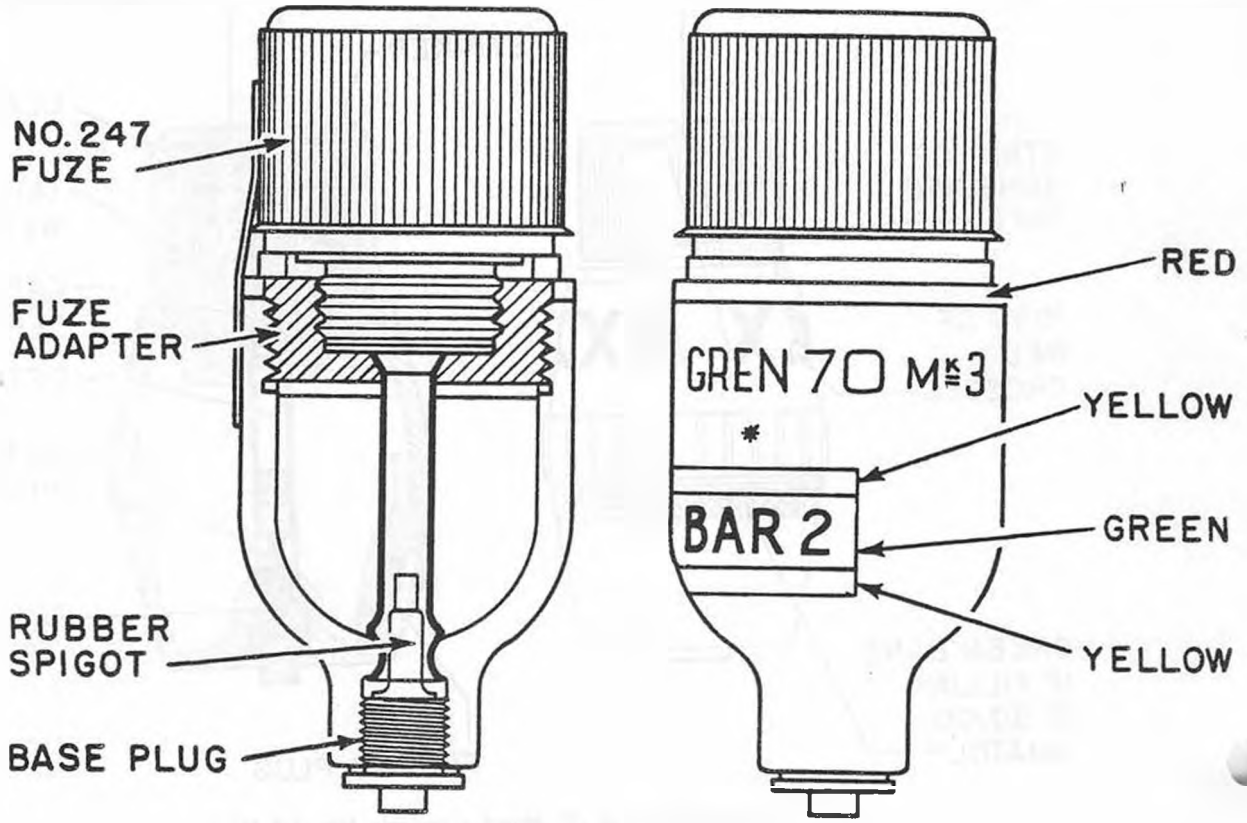


Figure 234—A./P. Hand Grenade No. 70 Mk III

Operation: The adhesive tape securing the fuze safety cap and the cap itself are removed. When the grenade is thrown, a weighted strip of tape withdraws the safety pin to arm the fuze. On impact, the striker overcomes the creep spring, and fires the cap, which initiates the detonator and, in turn, the main filling.

Remarks: The Grenade No. 70 Mk I was allocated to a small number of experimental designs not issued for service use.

The Hand Grenade No. 71 was a larger grenade of the same type construction as the No. 70, weighing approximately two pounds. The Grenade No. 71 was never adopted for service use.

A./P. Hand Grenade No. 82 Mk I (Service)

Data

Total weight .....2 lb. approx.
Filling .....Plastic explosive
Filling weight .....1 lb. approx.
Fuzing....No. 247 Mk I, II, or III, with short 4½ in. tape
Delay ..... None
Color.....Fuze, black; cup, buff; bag, black
Markings ..... Standard

Description: The body of this H.E. grenade, formerly known as the "Gammon Bomb," consists of a fabric bag, open at each end. The lower end of the bag is gathered, and an elastic band inserted around the edge, while the upper end fits under a steel cup. The edge is clamped

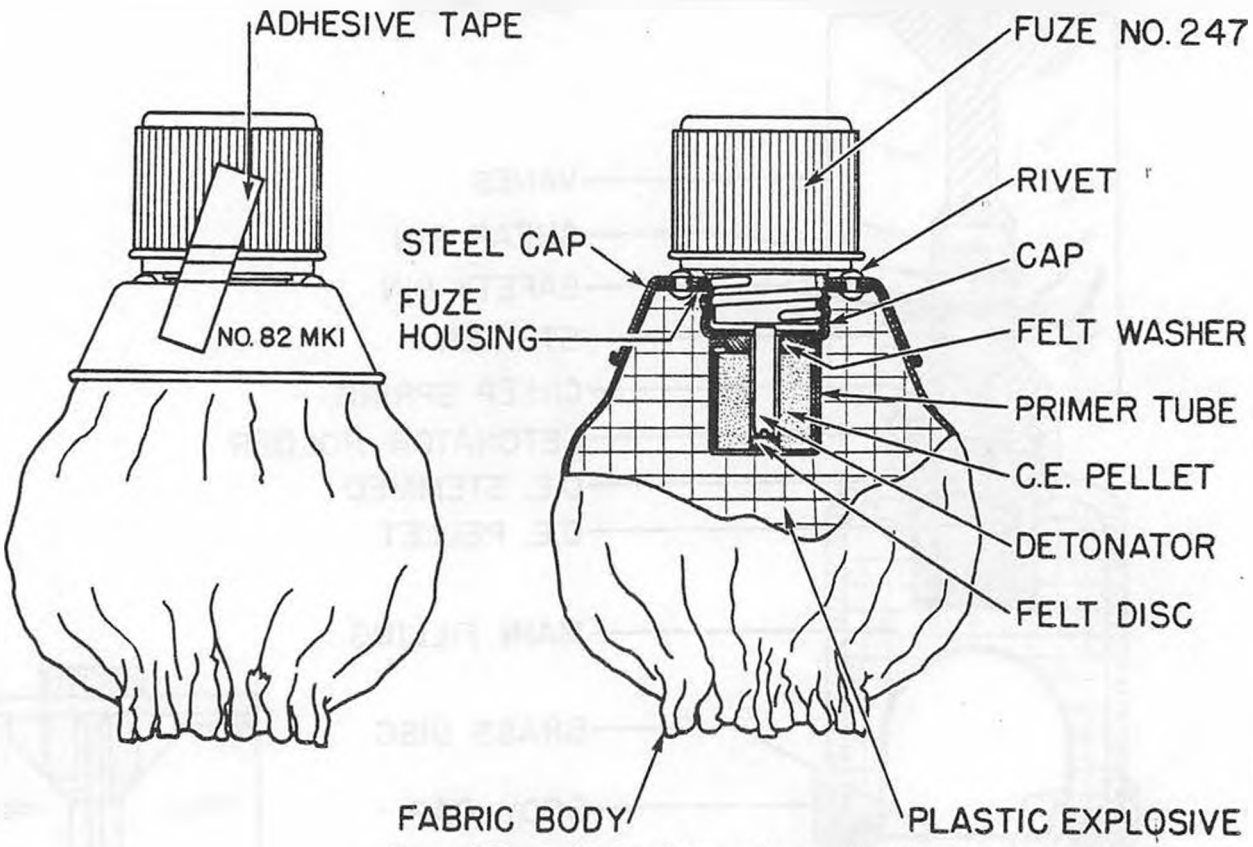


Figure 235—A./P. Hand Grenade No. 82 Mk I

between the cup and the flange of a tinned plate fuze housing by four equally spaced rivets. A tin-plate cap, to the lower end of which is secured an aluminum primer tube, is screwed over the fuze housing.

The grenade is fuzed with the Fuze No. 247 wound with 4½ in. of tape instead of the usual 12 in. The primer tube contains a C.E. pellet over which is placed a felt washer. A central perforation in the pellet accommodates a Detonator No. 78 Mk I with a felt disc inserted between it and the bottom of the primer tube.

The grenade is issued with the bag empty. The charge of plastic explosive is inserted through the bottom of the bag under local arrangements.

Operation: First the genade is primed and the plastic explosive inserted. The adhesive tape is then removed and the safety cap unscrewed in one-half of a turn. After the cap is removed, the tape must be held in place by the forefinger and thumb. When thrown, the weight on the end of the tape causes the tape to unwind and pull out the safety pin. Only the creep spring is now holding the striker away from the primer cap. On impact, the striker is forced into the primer cap, igniting the delay, which initiates the detonator and explodes the grenade.

Remarks: The No. 82 Mk I/I differs from the No. 82A Mk I in that it has a rot-proof fabric bag.

This grenade has a general anti-personnel application, but is used mainly by airborne forces as an anti-tank weapon.

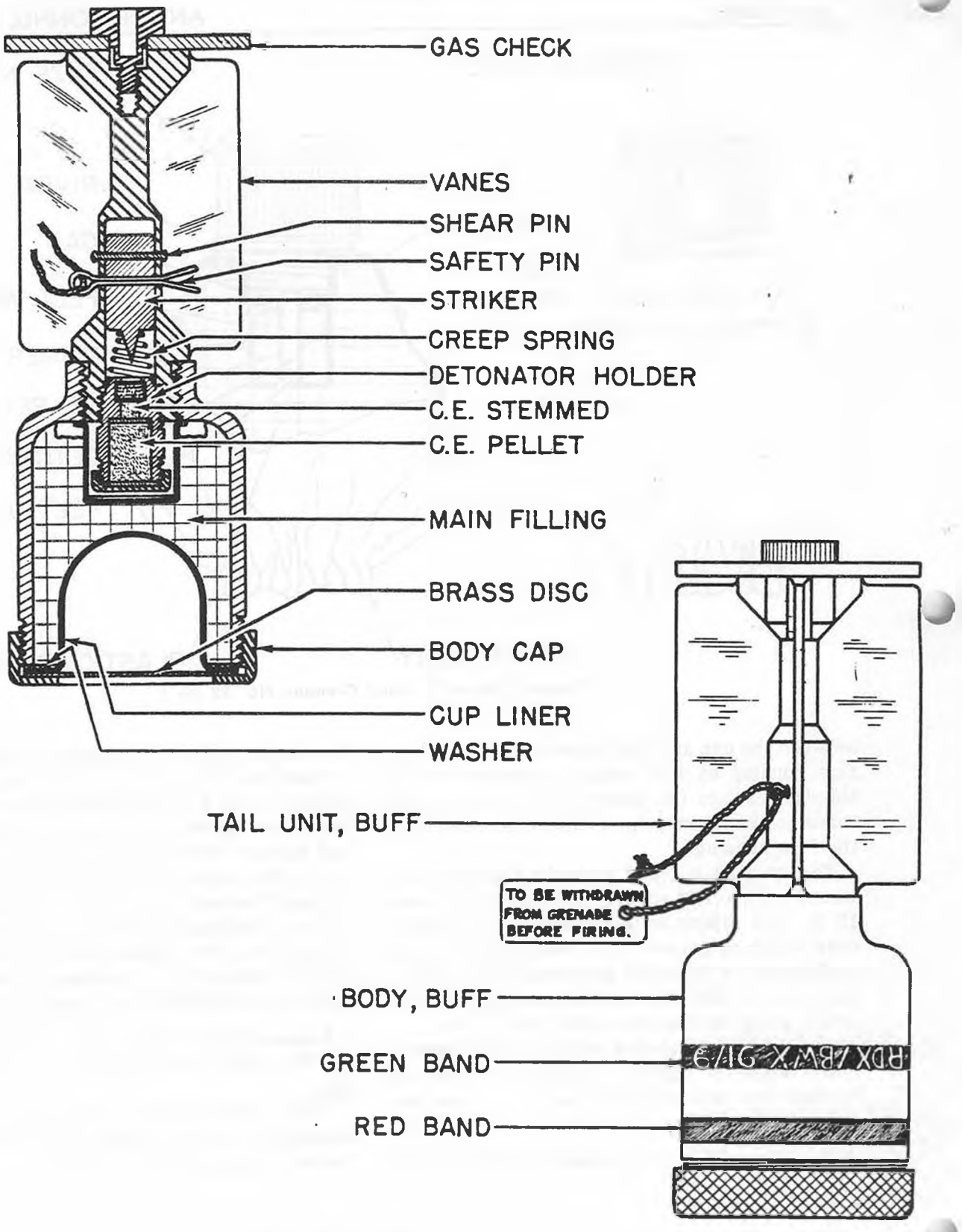


Figure 236—A./T. Rifle Grenade No. 68 Mk II

ANTI-TANK GRENADES

A./T. Rifle Grenade No. 68 Mks I-VI (Obsolete)

Data

Over-all length .....7 in.
Diameter .....2.5 in.
Total weight.....1 lb. 15½ oz.
Filling.....RDX/BWX 91/9, P.S., Lyddite, C.E./TNT 30/70 or Pentolite
Filling weight .....5.5 oz.
Delay ..... None
Color ..... Buff
Markings....Red filling band around top and green band around center of body

Description: The grenade consists of a steel or Mazak bell-shaped body fitted with a tail. The open end of the body is fitted with a thin metal cavity liner, which forms a hollow in the H.E. fitting. The cup is secured by a screw collar. The dome of the body is bored to carry the detonator holder and threaded to receive the tail section. The tail has four straight vanes and is centrally recessed to receive the striker. A copper shear wire and safety pin secure the striker in position. The pin is removed before the grenade is fired. The gas check plates are secured either by metal rivets, or in an integral casting with the fins of the grenade.

The following differences exist among the various marks of this grenade. The Grenade Mk I has small tail vanes and an additional small set of vanes on the body. A steel gas check is secured to the tail by a bakelite or brass screw. The brass cavity liner is hemispherical in shape.

In the Grenade Mk II the small vanes were removed from the body and the tail vane enlarged. The gas check was secured by a brass screw or by crimping the tail. In the Mk III a cylindro-conoidal steel cavity liner was substituted for the hemispherical liner previously used. The gas check was either secured by crimping, or was made of Mazak cast integrally with the tail unit. The Grenade Mk IV employed a new type of detonator holder, and had the tail unit and gas check cast integrally of Mazak. The Grenade Mk V also employed the new detonator holder, but used the steel gas check secured by crimping.

The Mk VI was produced in the United States. The tail unit consisted of a steel tail tube to which the tail fins were spot welded. A wooden plug, secured by a shoe rivet, closed the after end of the tail tube.

Operation: Before the grenade is fired from the discharger, the safety pin must be removed. The striker is located slightly away from the rear of the tube containing it. On setback, the striker moves to the rear, shearing the shear wire. It is then held only by the creep spring. On impact. the striker overcomes the creep spring and hits the detonator to explode the grenade. The effective range is given as 50 to 75 yards.

A./T. Hand Grenade No. 73 Mk I (Obsolete)

Data

Over-all length .....9½ in.
Diameter ..... 3¼ in.
Total weight .....4 lb.
Filling.....Polar ammon gelatine dynamite
Filling weight .....3¼ lb.
Fuzing.....No. 247 Mk I, II, or III
Delay ..... None
Color ..... Buff
Markings.....Red filling ring around the upper body and standard markings

Description: This is a thin-walled grenade intended for use against armored forces vehicles, but more generally used in demolition work. The grenade consists of a tin-plate container with a top of the same material, which screws onto the body by means of interrupted threads. A recess in the middle of the lid is threaded to take the Fuze No. 247. The fuze is cemented in position and issued with the grenade. The detonator tube screws into the lower portion of the

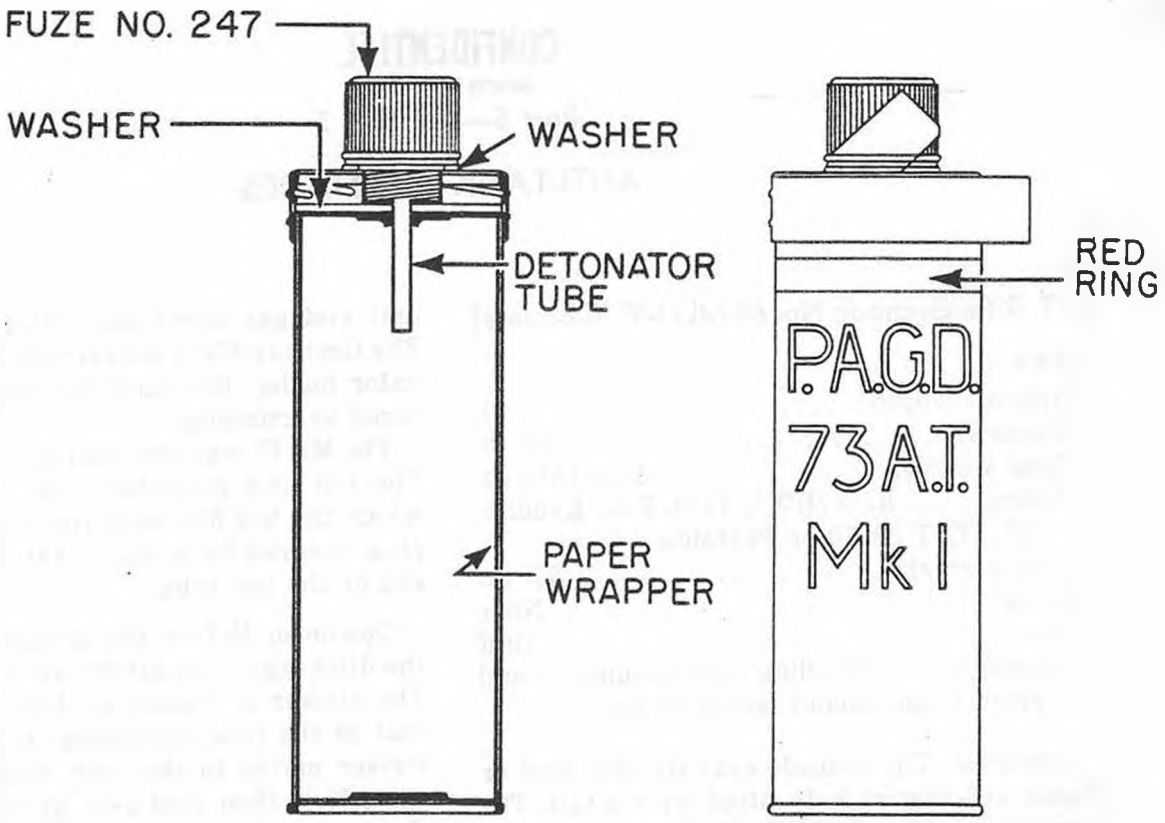


Figure 237—A./T. Hand Grenade No. 73 Mk I

fuze housing. A commercial Detonator No. 8 is used. A felt disc at the top of the filling absorbs any exudate from the explosive. A strip of adhesive tape secures the lid to the body on issue.

Operation: Before use, remove the adhesive tape, take off the lid, and unscrew the detonator holder. Insert the detonator, and replace the holder and lid. Then remove the adhesive tape from the fuze and unscrew the fuze cap. After the cap is removed, the safety tape must be held in place by the thumb and forefinger. When thrown, the weight on the end of the tape causes the tape to unwind and pull out the safety pin. Only the creep spring now separates the striker and primer cap. On impact, the striker is forced into the primer cap, which initiates the detonator and explodes the grenade.

A./T. Hand Grenade No. 74 Mks I and II (Obsolete)

Data

Over-all length	9 in.
Diameter	4½ in.
Total weight	2¼ lb.
Filling	Nobel's No. 823 explosive
Filling weight	1¼ lb.
Delay	5 seconds
Color	Body, buff; handle, black
Markings	Red filling band around the upper body

Description: The Grenade No. 74 Mk II consists of a globular bakelite flask containing the explosive filling, which is primarily nitro-glycerine and nitro-cellulose, a bakelite handle containing the firing mechanism, and an adhesive-treated sock. During filling, an air space is left to allow for expansion of the explosive. The sock covers the flask and is very sticky. The handle threads directly into the flask. Within the handle is a sharp striker and a striker spring. A safety lever fits under a nut on the head of the striker and down the handle to hold the striker up and the spring compressed. The top of the striker is spread to retain the nut. A safety pin passes through

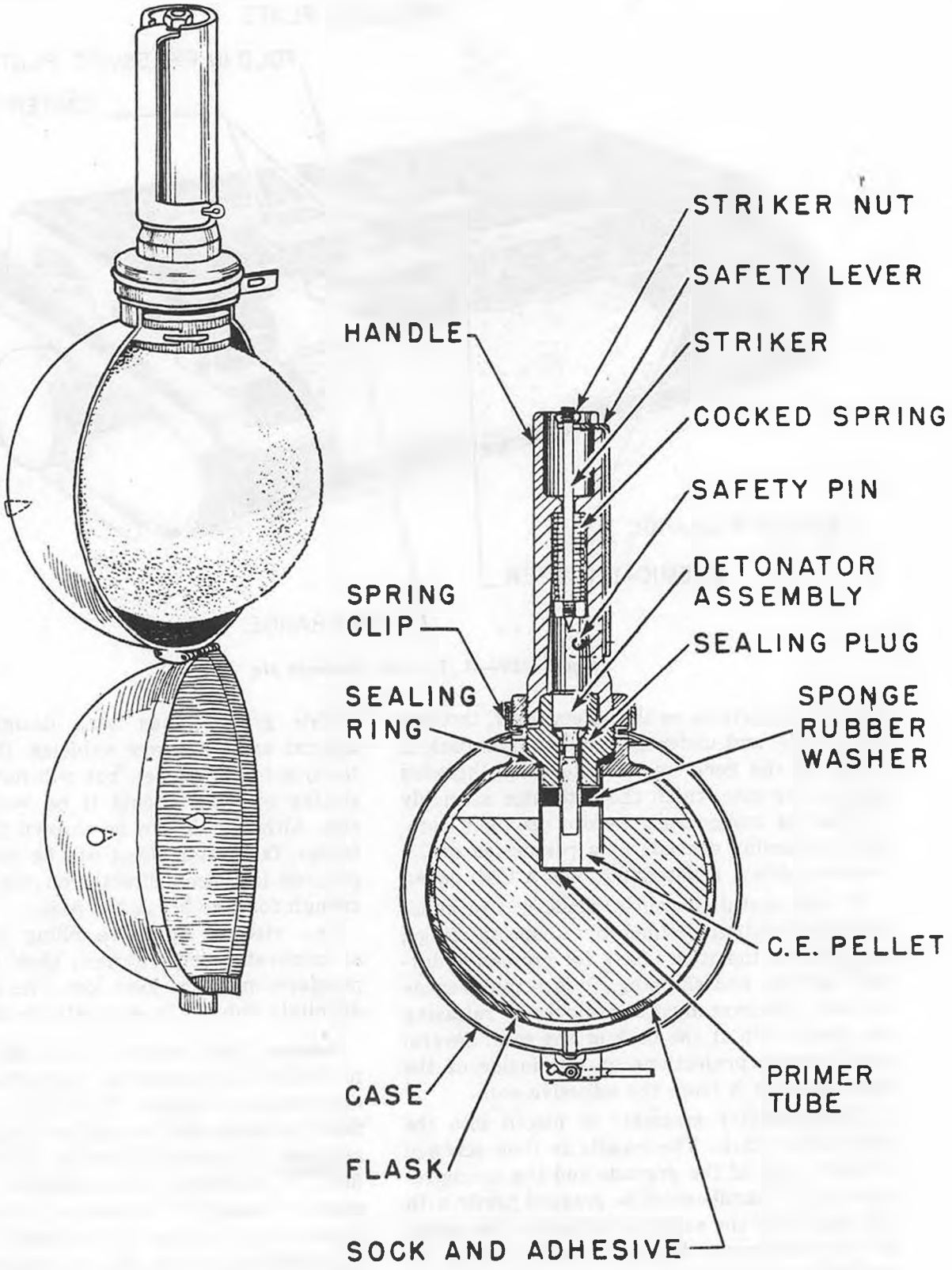


Figure 238—A./T. Hand Grenade No. 74 Mk II

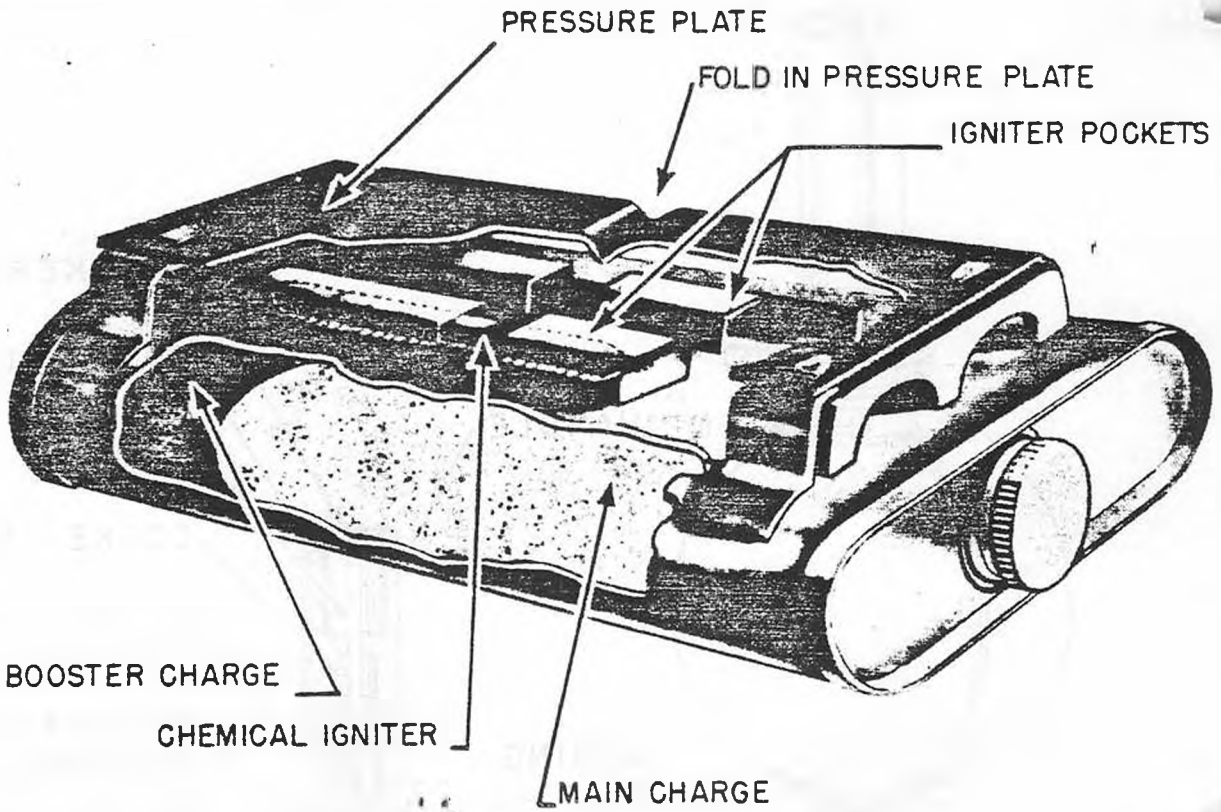


Figure 239—A./T. Hand Grenade No. 75 Mk I

holes in projections on the safety lever, through the handle, and under the striker. The flask is closed at the neck by an externally threaded safety plug into which the detonator assembly is inserted immediately before use. The detonator assembly consists of a percussion cap, a 5-second delay, a detonator, and a C.E. pellet.

A light metal container, made in two hemispherical sections joined by a spring hinge, clamps over the sticky flask for protection during handling and shipping. Before the grenade is used, this cover must be removed by releasing the spring clip at the neck of the case. Several small rubber projections on the inside of the case separate it from the adhesive sock.

The detonator assembly is placed into the well in the flask. The handle is then screwed into the neck of the grenade and the casing removed. The handle must be grasped firmly with the hand over the safety lever before the safety pin is withdrawn. After the safety pin is removed, the handle is released and the striker spring forces the striker down, throwing off the safety lever and striking the percussion cap.

This grenade has been designed for use against armored-force vehicles. It is supposed to stick to the target, but will not adhere to a sloping surface, should it be wet, muddy, or oily. Although it can be thrown for short distances, far better effect will be obtained if the grenade is placed directly on the target with enough force to break the flask.

The viscous explosive filling tends to run at moderate temperatures; thus storage temperatures must be kept low. The grenades are definitely subject to sympathetic detonation.

Remarks: The Grenade No. 74 Mk I is similar to the Mk II in operation, but differs in several constructional details. The Mk I had a glass flask which proved to be too fragile and was replaced by bakelite in the Mk II. The Mk I was filled to capacity with explosive and consequently leaked if expansion took place. The handle was fastened to the body by a plastic retaining ring which gave too weak a joint. The blunt striker was a frequent cause of misfires. The Mk I and II also employ slightly different detonator assemblies.

A./T. Hand Grenade No. 75 Mks I, II, and III (Service)

Data

Over-all length .....6½ in.
Width .....3⅝ in.
Height .....1⅞ in.
Total weight .....2¼ lb.
Filling.....Nobel's No. 704 B, Ammonal, Burrowite, or TNT (all with exploders or C.E. pellets)
Filling weight .....1¾ lb.
Fuzing....Mk I, Grenade Igniter No. 75 Mk II; Mk II and III, Detonator No. 83
Delay ..... None
Color ..... Buff
Markings.....Cap painted pink when Burrowite or Ammonal filled; red filling ring below cap indicates Victor Powder or Exp. No. 673 exploder; ring of red crosses indicates Polor Dynamite exploders
Pressure to fire .....300 lb.

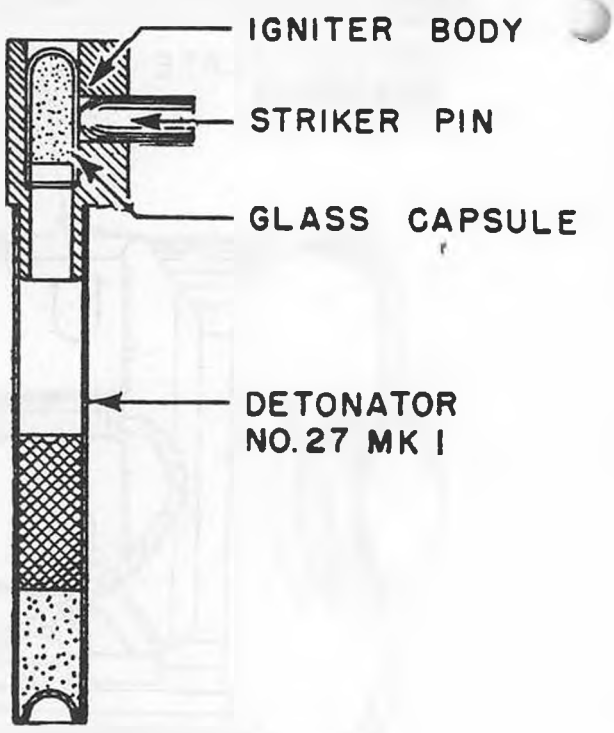


Figure 241—Detonator No. 83

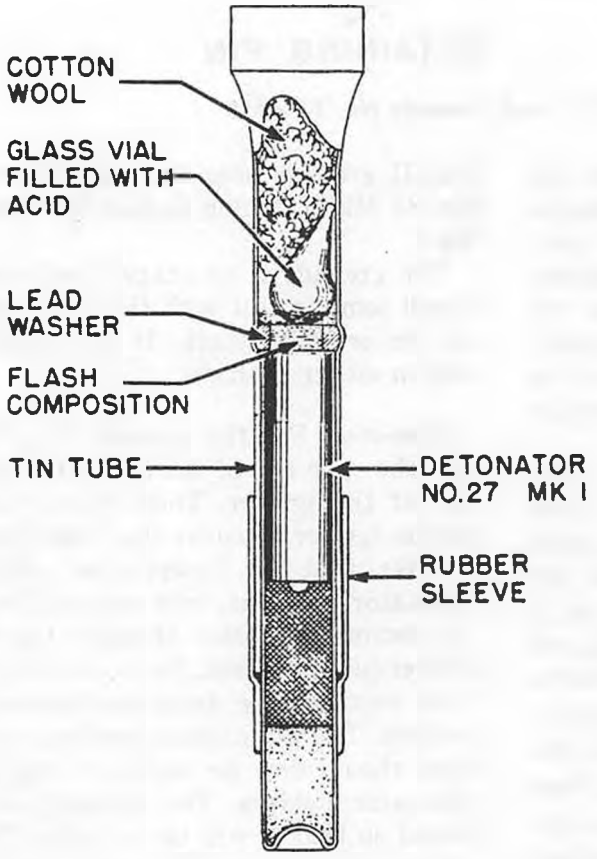


Figure 240—No. 75 Grenade Igniter Mk II

Description: The Grenade Mk I consists of a 1-pint capacity, flat, tin-plate can, which is rectangular in shape, and has rounded corners. It is filled through a hole in the end, over which a tin cap is screwed and cemented to provide watertightness. On one side of the can are two metal pockets with slots cut in them, which form the detonator holders. These pockets have malleable metal tabs which are bent to close them. The striker plate is supported above the detonator holders by two brackets, one on each end of the can. The striker plate is a light metal plate with a transverse projection on the bottom which serves as a striker. It is secured to the brackets by two bent tabs, so that the striker is immediately over the slots in the detonator holders. The principal differences beween the Grenades Mk I and Mk II lie in the fuze pockets, which in the Mk II are set at an angle for easier insertion of the fuze assemblies, and in the detonator assemblies. The Grenade Mk III is similar to the Mk II, but has no filling cap. It is filled with 1¾ lb. TNT, and two C.E. pellets.

The fuze for the Grenade No. 75 Mk I consists of an Igniter No. 75 Mk II and a detonato Two of these units are used with each grenade.

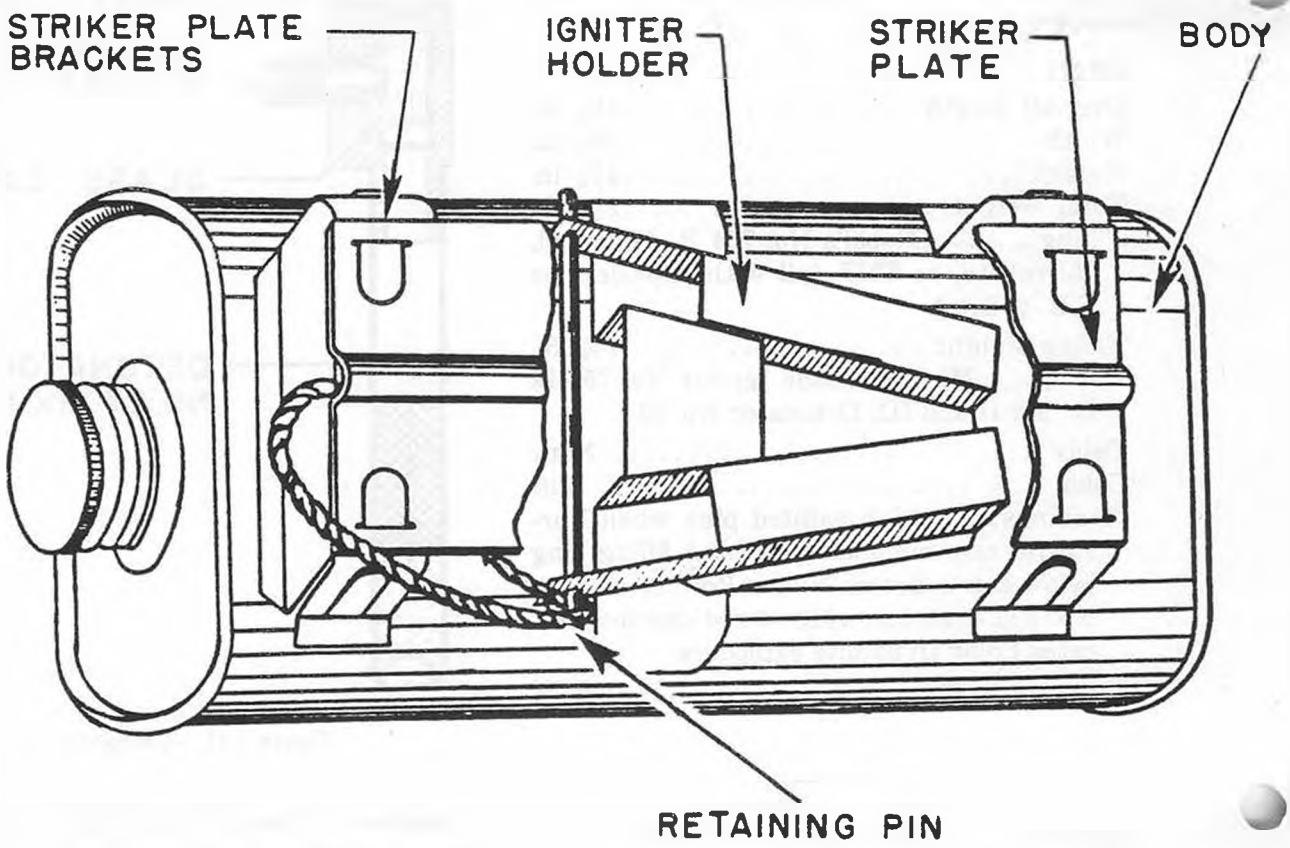


Figure 242—A./T. Hand Grenade No. 75 Mk II

The igniter is a tin-plate tube closed at one end by flattening, and it is painted red. It contains an acid-filled glass ampoule, and ignition composition. A rubber tube is rolled onto the igniter. The detonator is an aluminum tube open at one end, and is smaller in diameter than the igniter. The detonator is slipped into the open end of the igniter, and the rubber tube rolled over the joint to provide waterproofing.

In the Grenades Mk II and Mk III, the detonator units are manufactured and issued in one piece. Each Detonator No. 83 consists of a bakelite holder containing a glass ampoule, the end of which is sealed with wax. A striker pin is held in the top of the holder by means of a red cellulose seal. The detonator fits tightly over a tubular projection on the holder, and is sealed on with glue. As with the Grenade Mk I, two assemblies are provided with each mine. Pressure on the plate forces the striker pins into the ampoules, which fire the detonators and thus the main charge. The Grenade Mk II uses the C.E. filled Detonator No. 83 Mk I, while the Mk III grenade uses the RDK filled Detonator No. 83 Mk II, which is also designated No. 96 Mk I.

The grenade is so shaped that when thrown it will come to rest with the striker plate either on top or underneath. It will operate equally well in either position.

Operation: For the Grenade No. 75 Mk I, insert the open end of the detonator into the open end of the igniter. Then roll the rubber tube on the igniter to cover the joint. This provides a water-tight seal. Insert a detonator assembly, detonator end first, into each of the pockets of the detonator holder through the hole in the striker-plate bracket. Bend over the metal tabs, thus securing the detonator assemblies in the pockets. The red painted portions of the assemblies should now be visible in the slots of the detonator holders. The grenade is thrown or placed so that it will be run over. The pressure of the vehicle upon the striker plate will force the strikers through the slots in the detonator holders, crush the igniter tubes, and break the

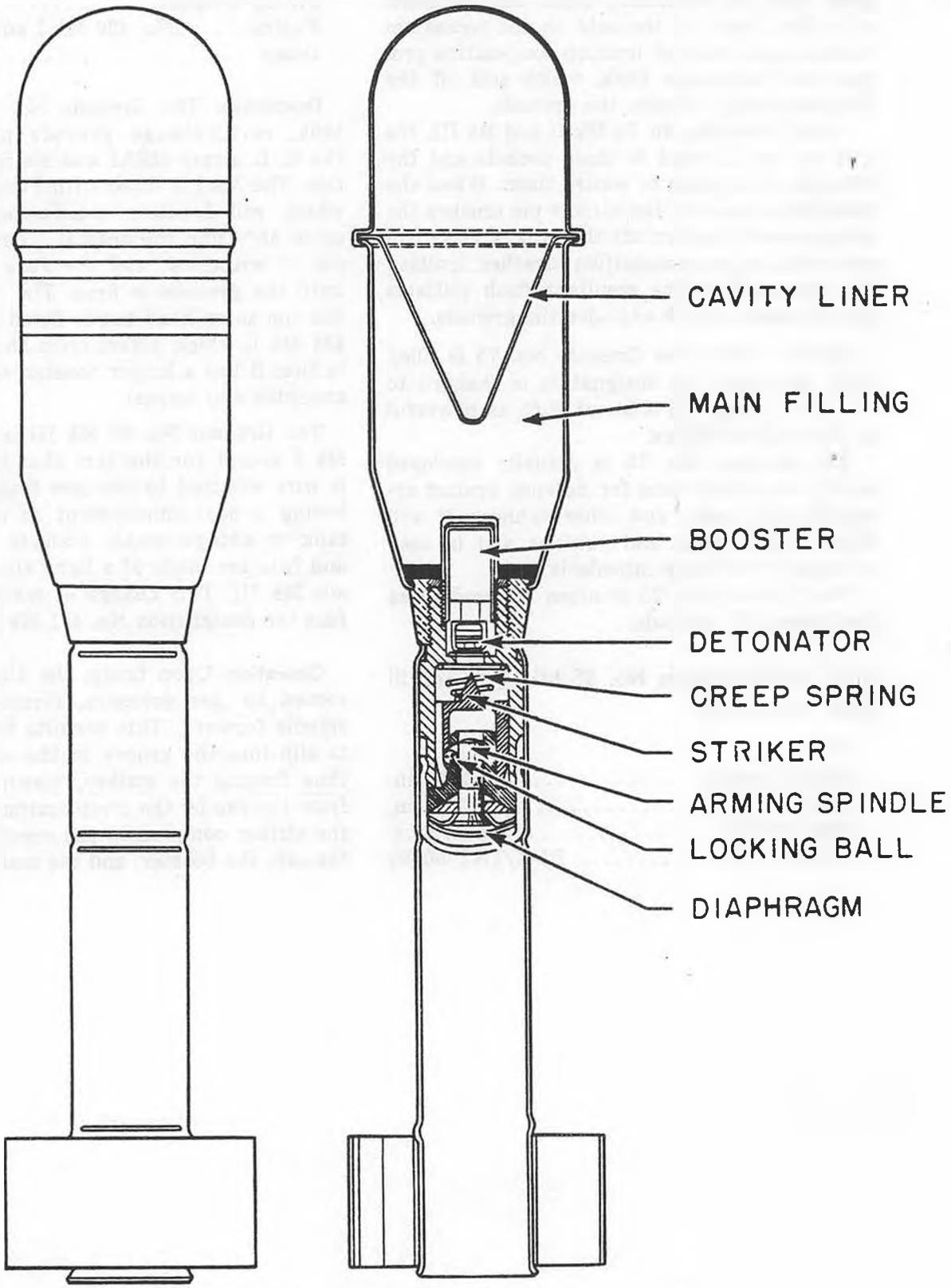


Figure 243—A./T. Rifle Grenade No. 85 Mk I

glass capsules containing nitric and sulphuric acid. The action of the acid on the potassium chlorate and charcoal ignition composition produces an immediate flash, which sets off the detonators and explodes the grenade.

In the Grenades No. 75 Mk II and Mk III, the igniters are inserted in their pockets and the tabs bent into place to secure them. When the grenade is run over, the striker pin crushes the glass ampoule and grinds the broken glass and contained igniter composition together, igniting the composition. The resultant flash initiates the detonator, which explodes the grenade.

Remarks: When the Grenade No. 75 is filled with Ammonal, the designation is changed to No. 75 A. Ammonal is about 80% as powerful as the regular fillings.

The Grenade No. 75 is actually employed mainly as a land mine for defense against armored cars, tanks, and other vehicles. It will disable light tanks and vehicles and is used principally for hasty minefields.

The Grenade No. 75 is often referred to as the "Hawkins" grenade.

A./T. Rifle Grenade No. 85 Mks I, II, and III (Soon in Service)

Data

Over-all length .....10½ in.
Diameter ..... 1⅞ in.
Total weight .....1 lb. 6 oz.
Filling ..... RDX/TNT 50/50
Filling weight .....4½ oz.
Fuzing.....No. 430 Mk I and No. 431 Mk I
Delay ..... None

Description: The Grenade No. 85 is an antitank, cavity-charge grenade patterned after the U. S. Army M9A1 and similar in construction. The Mk I is fitted with Fuze No. 430 Mk I, which will function satisfactorily on impact up to 45° from the normal. There is no safety pin to withdraw, and the fuze does not arm until the grenade is fired. The Grenade Mk II has the same head but is fitted with Fuze No. 431 Mk I, which differs from the Fuze No. 430 in that it has a longer booster, and is easier to assemble and inspect.

The Grenade No. 85 Mk III is similar to the Mk I except for the fact that the lower body is wire wrapped to increase fragmentation, allowing a dual employment as either an antitank or anti-personnel grenade. The tail tube and fuze are made of a light alloy in the Grenade Mk III. This change of material gives the fuze the designation No. 431 Mk I/I.

Operation: Upon firing, the diaphragm is reversed by gas pressure, forcing the arming spindle forward. This permits the locking ball to slip into the groove in the arming spindle, thus freeing the striker, which is held away from the cap by the creep spring. Upon impact, the striker compresses the creep spring to fire the cap, the booster, and the main filling.

SMOKE, ILLUMINATING, AND INCENDIARY GRENADES

Smoke Hand Grenade, W.P., No. 77 Mks I and II (Service)

Data

Over-all length .....4.65 in.
Diameter .....2.3 in.
Total weight .....13.5 oz.
Filling .....White phosphorus
Filling weight .....8 oz.
Fuzing.....No. 247 Mk I, II, or III
Delay .....None
Color .....Green
Markings....Mk II has red and white bands around center.

Description: The tin-plate body is cylindrical in shape except near the base, which is in the form of a truncated cone. The coned portion has a flat base in which the filling hole is formed. The hole is closed by a soldered lid. The tin-plate closing arrangement at the head of the body includes a threaded socket with a central pocket for the detonator. The socket receives the housing for the attachment of the fuze. The tin-plate housing serves as an adapter for the attachment of the fuze to the body, and is in the form of a cap with a knurled periphery and a socket. The socket has a central hole and is threaded to engage with the socket in the body.

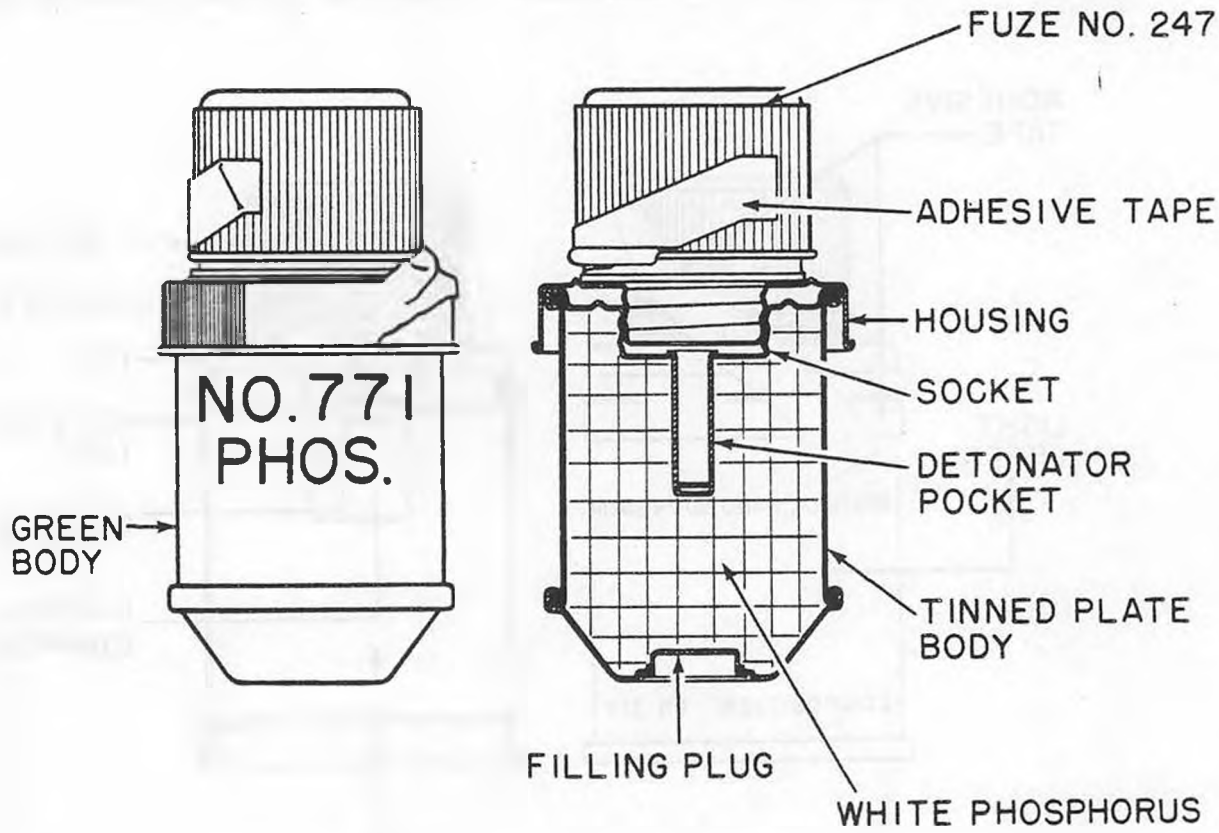


Figure 244—Smoke Hand Grenade, W.P., No. 77 Mk I

Operation: The housing, together with the fuze, is removed by unscrewing the housing; and the detonator is inserted in the pocket with the open end towards the fuze.

The adhesive tape is then removed and the safety cap unscrewed in one-half turn. After the cap is removed, the tape must be held in place by the forefinger and thumb. When thrown, the weight on the end of the tape causes the tape to unwindd and pull out the safety pin. Only the creep spring is now holding the striker away from the primer cap. On impact, the striker is forced into the primer cap, which initiates the detonator and explodes the grenade, scattering the white phosphorus. The white phosphorus ignites spontaneously on contact with air, causing a heavy white smoke screen. The small fragments of phosphorous are of an incendiary nature.

Remarks: The Mk II model was introduced to enable this grenade to be used for training without incurring the risk of fire which attends the use of the Mk I. The Mk II model has a cylindrical body and is filled with titanium tetrachloride. The Grenade Mk II is used only in training and is not issued for use under service conditions. The Grenade Mk I/I has a seamless body.

Smoke Hand Grenade No. 79 Mk I (Obsolete) and Mk II (Service)

Data

Over-all length .....7⅔ in.
Maximum diameter .....4 in.
Total weight....1 lb. 10 oz., 1 lb. 12 oz., or 1 lb. 6 oz. depending upon filling
Filling and weight....P.N. 83 (M), 14½ oz.; P.N. 398 or 436, 1 lb. 3 oz.; P.N. 317 or 411, 1 lb. 5 oz.
Fuzing.....No. 247 Mk I, II, and III
Delay .....None
Color .....Light green
Markings .....Standard

Description: This grenade has a cylindrical tinplate body. The lid is soldered in one or t

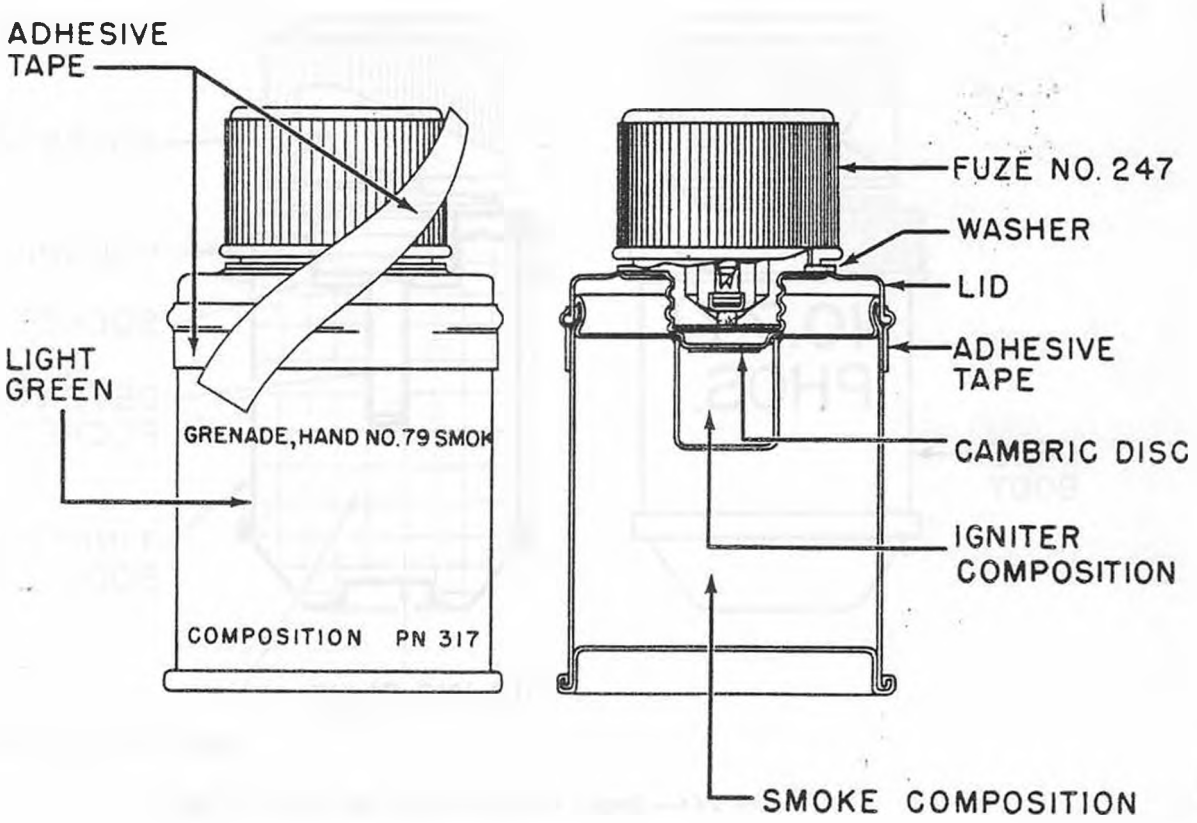


Figure 245—Smoke Hand Grenade No. 79 Mk I

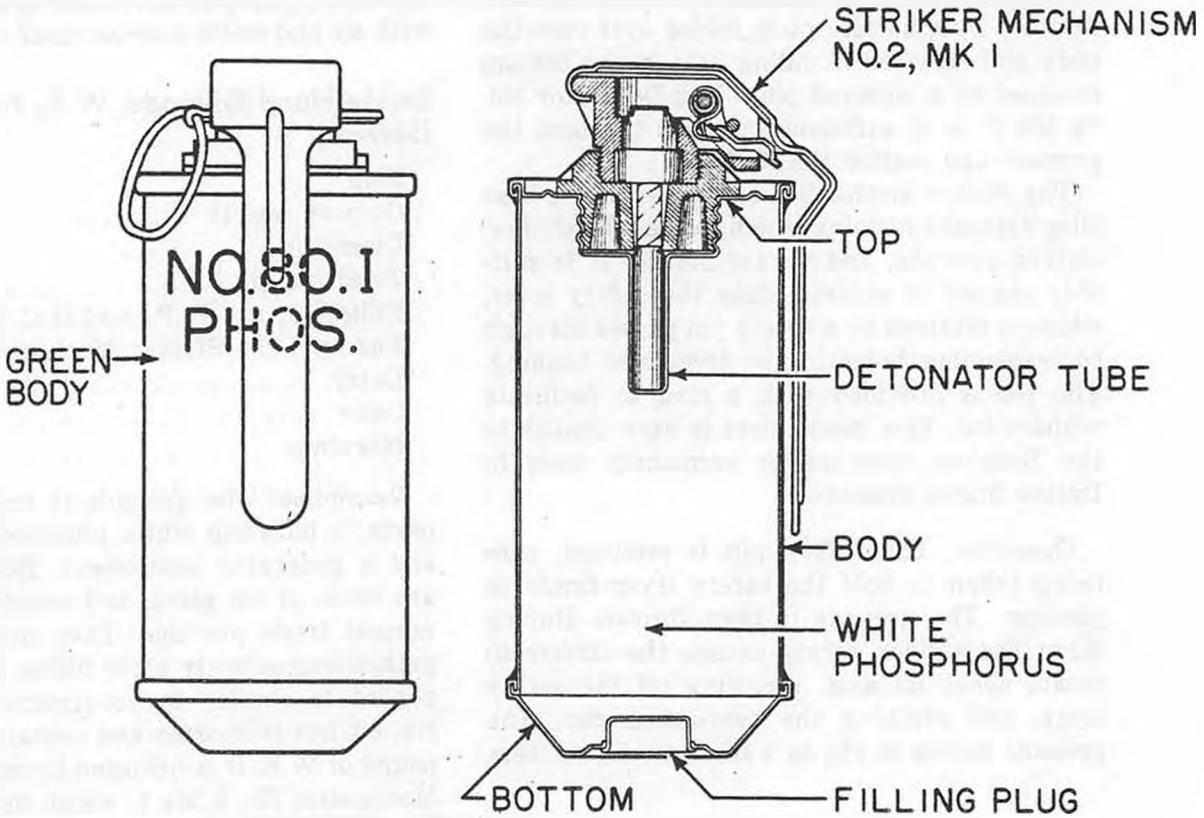


Figure 246—Smoke Hand Grenade, W.P., No. 80 Mk I

places to the body, and further secured by adhesive tape. The body is closed by a disc, which is pressed in and fitted with a container for the igniter, while the lid carries a threaded socket for the fuze holder.

The grenade is filled with a smoke mixture, and the igniter container with P.N. 227 composition. A gunpowder-primed cambric disc is fitted above the container to pick up the flash from the fuze and ignite the P.N. 227.

Operation: The adhesive tape and the fuze cap are removed. When the grenade is thrown, the tape unwinds and withdraws the safety pin. Only the creep spring is then holding the striker away from the primer cap. On impact, the striker is forced against the cap. Smoke emission commences about five seconds later and continues for about 1½ minutes.

Remarks: The Grenade Mk II is similar in construction to the Mk I, but employs a Bouchon type igniter designated Striker Mechanism No. 5.

Smoke Hand Grenade, W.P., No. 80 Mk I (Service)

Data

Over-all length	5.5 in.
Diameter	2.4 in.
Total weight	19½ oz.
Filling	White phosphorus
Filling weight	13 oz.
Fuzing	Striker Mechanism No. 2
Delay	2½-4 sec.
Color	Green
Markings	Standard

Description: The empty components of this smoke grenade comprise a cylindrical body, top, detonator tube, bottom with filling hole, and a filling-hole plug. All are of tin plate except the detonator tube, which is of brass. The top is secured to one end of the body by a folded joint, which is soldered. A threaded recess in the top accommodates the striker-mechanism adapter and also carries the detonator tube, which is secured to it by soldering. A charge of

white phosphorus is contained in the body and retained by a bottom plate folded over onto the body and soldered. A filling hole in the bottom is closed by a soldered plug. The Detonator No. 75 Mk II is of sufficient strength to burst the grenade and scatter the W.P.

The striker mechanism comprises a zinc-base alloy (Mazak) housing which carries the striker, striker axis pin, and striker spring. It is suitably shaped to accommodate the safety lever, which is retained by a safety pin passed through corresponding holes in the lever and housing. The pin is provided with a ring to facilitate withdrawal. This mechanism is very similar to the Bouchon type igniter commonly used in United States grenades.

Operation: The safety pin is removed, care being taken to hold the safety lever firmly in position. The grenade is then thrown. During flight the striker spring causes the striker to rotate about its axis, throwing off the safety lever, and striking the percussion cap. The grenade bursts in 2½ to 4 seconds and scatters the white phosphorus, which ignites on contact with air and emits a dense cloud of white smoke.

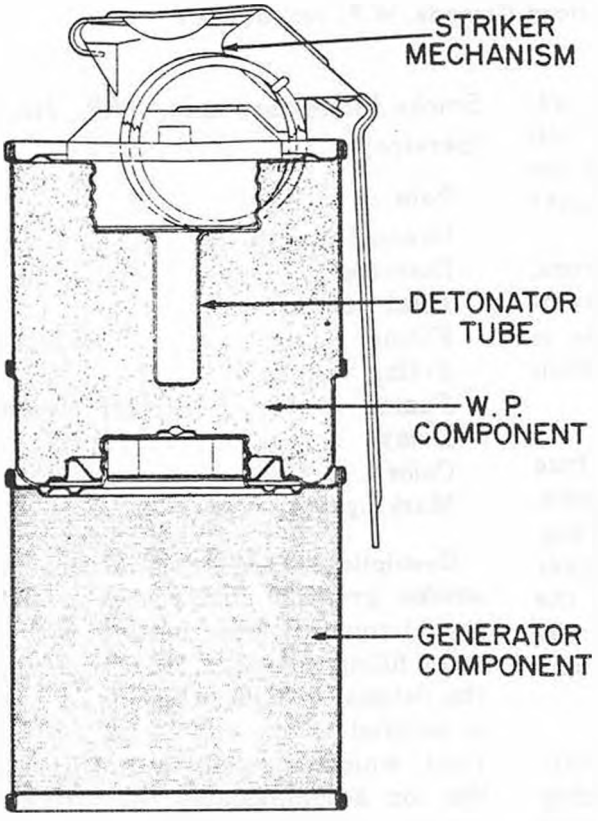


Figure 247—Smoke Hand Grenade, W.P., No. 81 Mk I

Smoke Hand Grenade, W.P., No. 81 Mk I (Service)

Data

Over-all length	5.25 in.
Diameter	2.4 in.
Total weight	1½ lb.
Filling	W.P., and H.C. Smoke Mixture
Fuzing	Striker Mechanism No. 3 Mk I
Delay	2½ to 4 sec.
Color	Green
Markings	Standard

Description: The grenade is composed of two parts; a bursting white phosphorus component and a generator component. Both components are made of tin plate, and construction follows normal trade practice. They are cemented together immediately after filling. The W.P. component is similar in construction to Grenade No. 80, but is shorter and contains about half a pound of W.P. It is initiated by means of Striker Mechanism No. 3 Mk I, which fires a Detonator No. 75 Mk II. The striker mechanism is screwed into a recess in the top of the W.P. component above a brass detonator tube. The adapter of the striker is cemented in position. The housing can be unscrewed for priming. This housing carries the spring-loaded striker held back by the safety lever and safety pin. The adapter and housing castings are made of zinc-base alloy.

The Detonator No. 75 Mk II consists of a cap mounted in a die-cast cap chamber (similar to Detonator No. 35M) with a length of Safety Fuse No. 17 Mk I Bickford to which is crimped a Detonator No. 78. The generator component is filled with H.C. Smoke Mixture and is ignited by a primed cambric disc, which is ignited by the flash of the detonator. This component is screwed and cemented to the bottom of the W.P. component.

Operation: The grenade is primed by removal of the housing assembly, insertion of detonator, and reassembly of the striker mechanism. To function, the lever is held firmly against the grenade body and the safety pin removed. As soon as the grenade is thrown, the fly-off lever leaves the body of the grenade and the cap is

struck. The detonator fires after a delay of 2½ to 4 seconds, producing an immediate burst of white phosphorus. The smoke and incendiary effects are comparable with Grenade No. 77 Mk I, and the safety distance is a little greater. The generator component is ignited when the detonator bursts and attains full emission before the phosphorus smoke is dissipated. Rapid smoke emission from the generator then follows for about 45 seconds.

Colored Smoke Hand Grenade No. 83 Mks I and II (Service)

Data

Over-all length .....4.45 in.
Diameter ..... 2.55 in.
Total weight .....16 oz. (approx.)
Filling..... P.N. 469A, red smoke;
P.N. 473A, yellow smoke;
P.N. 468A, green smoke;
P.N. 471A, blue smoke
Filling weight .....6 oz. (approx.)
Fuzing.....Mk I, Match Composition Igniter: Mk 2, Striker Mechanism No. 3 Mk I or No. 4
Delay ..... 4 sec.
Color ..... Green
Markings ..... Standard

Description: This smoke grenade is cylindrical in shape and contains a perforated canister filled with blue, green, red, or yellow smoke composition. The igniting arrangements are carried in the head. The grenade body is of tin plate, while all other empty components are of black plate.

The No. 83 Mk I has a flanged top secured to one end of the body by a folded joint. The top is recessed to accommodate the match head. Four equi-spaced smoke-emission holes are prepared around the top and sealed by shellacked adhesive tape. Match composition P.N. 196 is filled into the hole of a cylindrical cork match head, the composition being built up on on the outside to give a good striking medium. A striker, in the form of a strawboard washer primed with striker composition P.N. 288 on one-half of one side, is carried in the top of the body, primed side uppermost.

The canister body, with its perforations covered by a wrapping of paper coated with glue or other adhesive, is fitted at one end with a

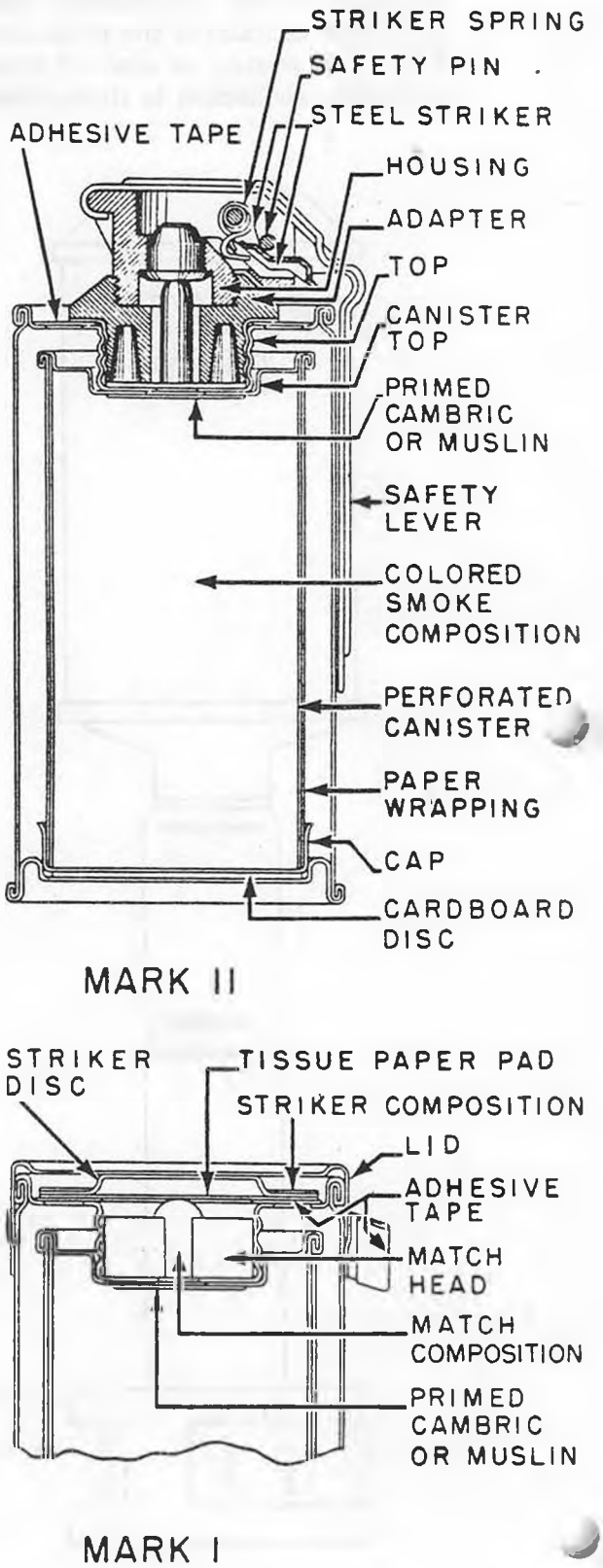


Figure 248—Colored Smoke Hand Grenade No. 83

flanged top folded over onto the body. The top is shaped to seat the recessed top of the grenade body containing the match head, and has a one-inch square, or disc, of primed cambric or muslin, shellacked to its underside with the primed surface adjacent to about three drams of composition stemmed into the neck of the canister. The canister is closed by a cap and retained in the grenade body by a bottom plate.

A lid fits over the body for transit purposes.

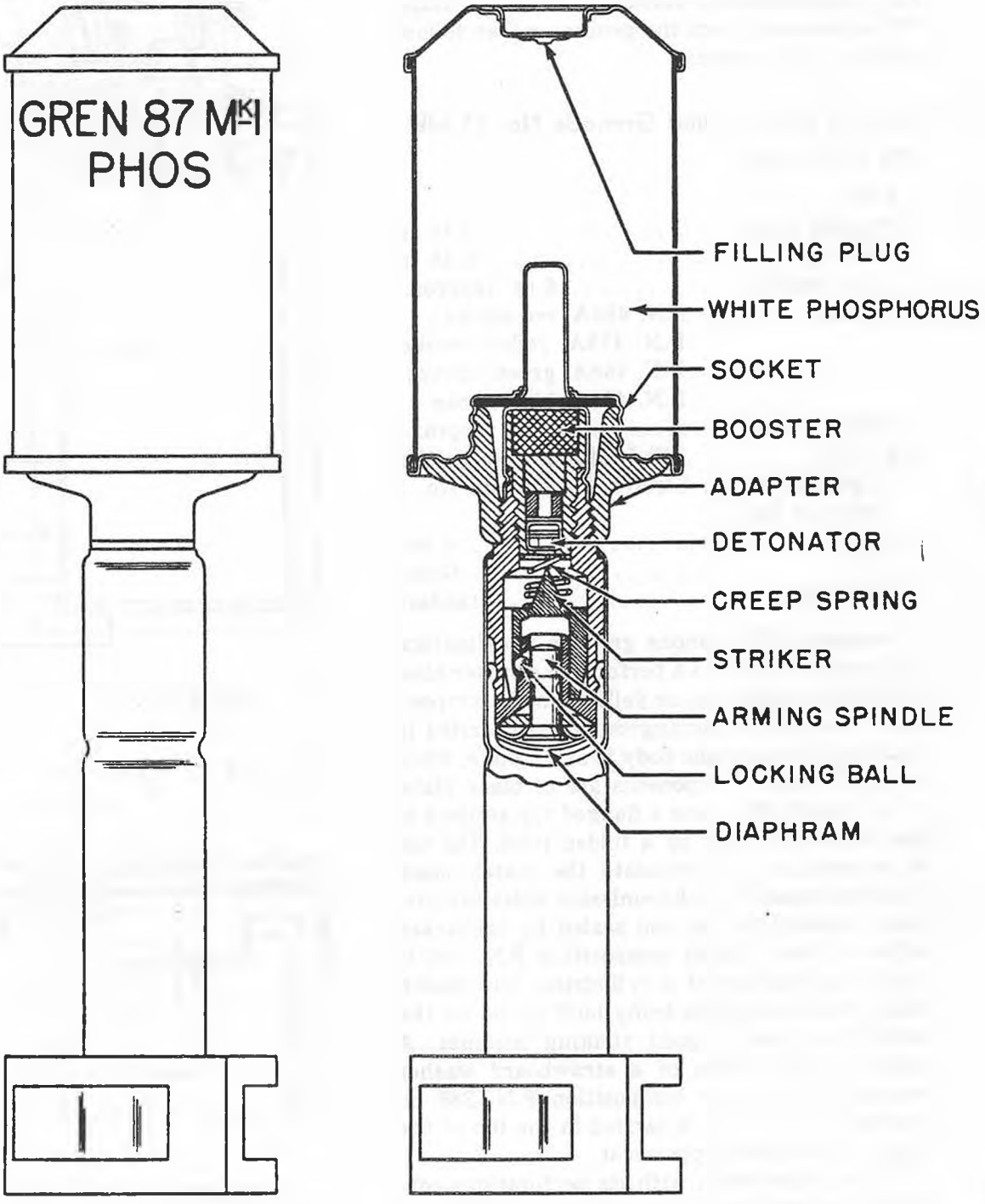


Figure 249—Smoke Rifle Grenade, W.P., No. 87 Mk I/L

The junction of the lid and body is sealed with a strip of adhesive tape formed with a tab to facilitate removal. To prevent accidental functioning of the match composition, a pad of tissue paper is interposed between lid and igniter.

The Grenade No. 83 Mk II differs from the Grenade Mk I in being fitted with a Striker Mechanism No. 3 Mk I or No. 4, instead of a match head. Into the recess in the top of the grenade body is screwed a Mazak alloy adapter for the striker mechanism. Fitting of the striker mechanism precludes the fitting of a lid to the grenade as in the Mk I.

Operation: First remove the lid and striker of the Grenade Mk I. The striker must then be drawn sharply across the match composition. Smoke is emitted about four seconds after ignition and continues for 20-40 seconds.

In the Mk II, no priming is necessary, as the grenades are issued assembled with igniters complete and ready for use. The safety pin is removed and the fly-off lever held firmly in position until the grenade is thrown. During flight, the striker is rotated around the axis-pin by its spring and the fly-off lever is thrown clear. The striker fires the cap, and a delay of about four seconds ensues before smoke emission commences. Effective emission continues for about 25 to 45 seconds.

Remarks: The Grenade No. 83 Mk I was never produced. The Striker Mechanism No. 4 differs from the No. 3 in that it has a plastic body.

Smoke Rifle Grenade, W. P., No. 87 Mk 1/L (Service)

Data

Over-all length	10.35 in.
Diameter	2.13 in.
Total weight	1 lb. 4 oz.
Filling	W.P.
Filling weight	9 oz.
Fuzing	No. 431 Mk I, II, or III
Delay	None
Color	Green
Markings	Standard

Description: The Grenade No. 87 is a smoke rifle grenade. The complete grenade consists of a white phosphorus filled head, an adapter, fuze, and tail unit. The head is similar in construction to the Smoke Grenade No. 77 Mk I, differing only slightly in size and markings. An adapter, which threads into the after section of the grenade head, is itself internally threaded to take the tail unit. The tail unit and fuze of this grenade are similar to those used in the Rifle Grenade No. 85.

Operation: Same as for the Grenade No. 85 except that explosion of the booster bursts the grenade case, spreading the white phosphorus, which ignites when exposed to air.

2.5-in. Signal and Illuminating Rifle Grenade Nos. 57, 58, 59, 60, 61, and 62 (Obsolescent)

Data

Grenade No. 57

Type of grenade	Illuminating
Number of stars	
Burning time	5½ sec.
Total weight	1 lb. ½ oz.
Over-all length	2¾ in.
Color	Buff
Markings	Red star in a white circle

Grenade No. 58

Type of grenade	Illuminating with parachute
Number of stars	1
Burning time	28 sec.
Total weight	1 lb. 7 oz.
Over-all length	5 in.
Color	Buff
Markings	Red star in a white circle

Grenade No. 59

Type of grenade	Day signal
Number of stars	12 red, or 12 green, or combination
Burning time	7 sec. approx.
Total weight	1½ lb.
Over-all length	3½ in.
Color	Buff
Markings	Colored or parti-colored triangle to indicate star colors; "M" stencilled on triangle

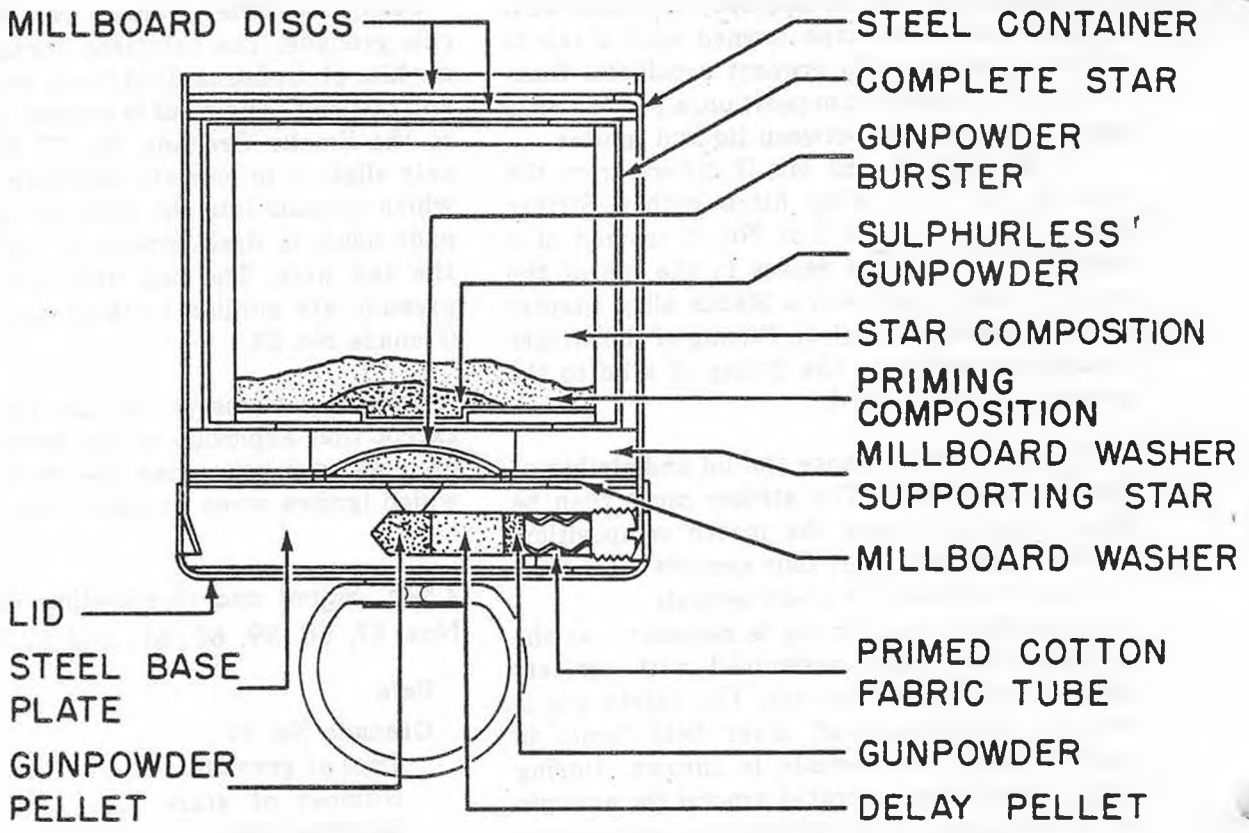


Figure 250—2.5-in. Illuminating Rifle Grenade No. 57 Mk I

Grenade No. 60
- Type of grenade.....Night signal
- Number of stars.....12 red, or 12 green, or combination
- Burning time..11½ sec., red; 8 sec., green
- Total weight .....1½ lb.
- Over-all length .....3½ in.
- Color ..... Buff
- Markings.....Colored or parti-colored disc to indicate star colors; "M" stencilled on disc

Grenade No. 61
- Type of grenade.....Day signal with parachute
- Number of stars..3 red, or 3 green, or combination
- Burning time...25 sec., red; 20 sec., green
- Total weight.....1 lb. 4½ oz.
- Over-all length ..... 5½ in.
- Color ..... Buff
- Markings..Three colored triangles to indicate star color

Grenade No. 62
- Type of grenade.....Night signal with parachute
- Number of stars.....3 red, or 3 green, or combination
- Buring time....12 sec., red; 19 sec., green
- Total weight.....1 lb. 4½ oz.
- Over-all length.....5½ in.
- Color ..... Buff
- Markings..Three colored discs to indicate star color

Description: The construction of this entire series of grenades is generally similar to that of the 2.5-in. Illuminating Rifle Grenade No. 57 Mk I, whose description follows.

The body of the grenade consists of a cylindrical steel case, whose base is closed by a steel base plate. The top of the body is closed by several millboard discs. A friction-fit steel lid, with a ring for easy removal, fits over the base to protect the ignition system.

The base plate of the grenade has a drilled radial hole, which contains the ignition system.

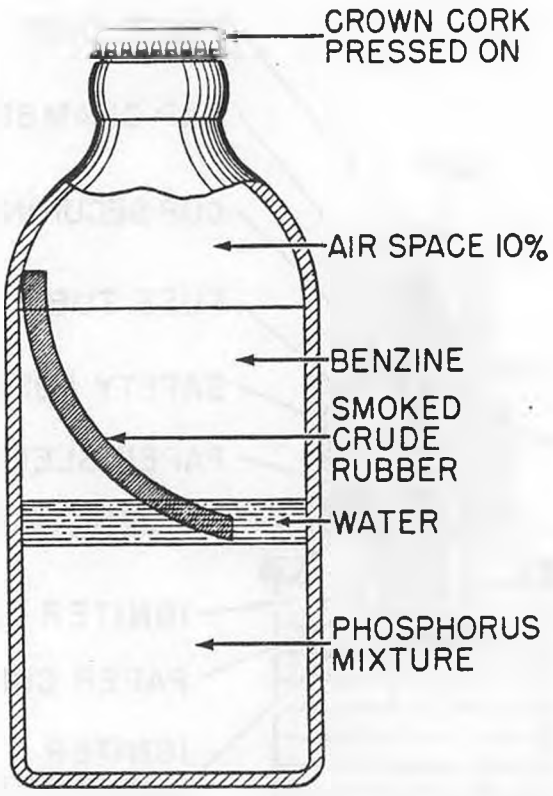


Figure 251—Incendiary Hand or Rifle Grenade No. 76 Mk I

A small hole connected to its outer end allows the flash of the cartridge to contact the ignition system, while a coned hole at its inner end leads to the gunpowder burster in the interior of the grenade. The ignition system, which is retained in the radial hole by a screwed plug, consists of a tube of primed cotton cambric, a layer of gunpowder, a delay pellet, and another small charge of gunpowder, which relays the flash to the gunpowder burster of the grenade. The paper-wrapped star rests on a millboard disc, which separates it from the gunpowder burster. The star composition is ignited by a layer of priming composition, in turn ignited by a small charge of sulphurless gunpowder; all of which are integral components of the star.

Operation: The base lid is removed and the grenade inserted into the discharger cup base-first. On firing, the propellant gases initiate the ignition system of the grenade and propel it into the air. The delay allows the grenade to reach a height of approximately 250 ft. before the burster ejects and ignites the star.

Remarks: These grenades are used in the 2½-in. discharger cup and fired by means of the 0.303-in. H. Rifle-Grenade Cartridge Mk IZ. The 2-inch mortar signal and illuminating bombs have largely replaced this series.

Incendiary Hand or Rifle Grenade No. 76 Mk I (Obsolete)

Data

Total weight.....19 oz.
Filling.....128 cc phosphorus mixture (75% phosphorus and 25% sulphide of phosphorus) 21 cc water, 110 cc benzine, and a stick of crude rubber 3½ in. long and ¼ in. in diameter.
Markings.....Red caps indicate suitability for hand throwing only; green caps indicate suitability for hand throwing or projecting.

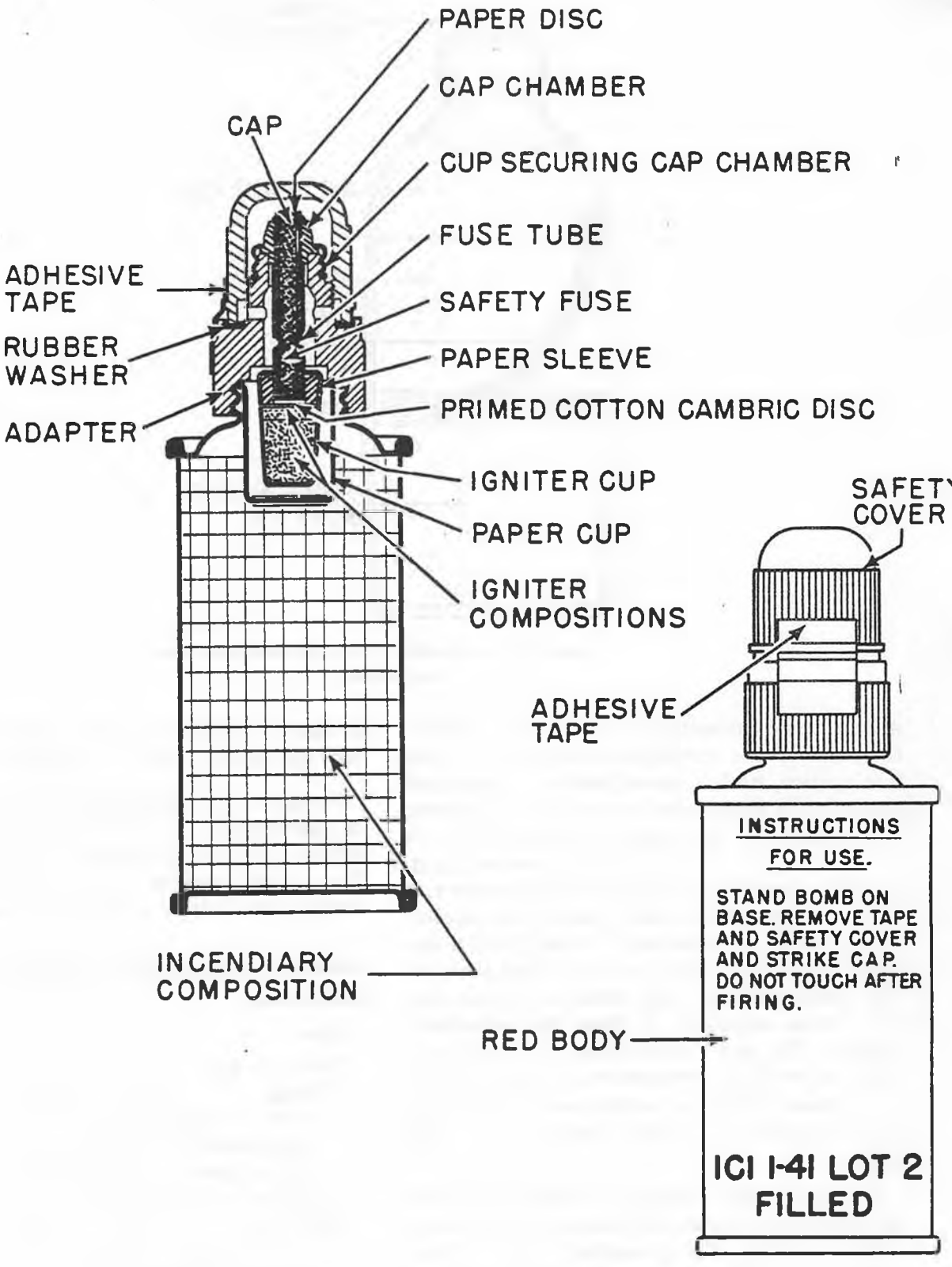


Figure 252—1 ¼-lb. Incendiary Bomb Mk I

Description: This grenade consists of a short-necked, ½ pint glass bottle containing an incendiary filling, and closed by a crown cap. Ten per cent free space is left above the filling for expansion. During storage, the strip of crude rubber dissolves and increases the viscosity of the liquid.

Operation: The grenade must be thrown or projected with enough force to break on impact. When broken, the phosphorus mixture ignites on contact with the air, thus setting the benzine alight. The grenade is designed to be thrown against armored-force vehicles to produce an incendiary and smoke effect.

Remarks: The grenade should not be shaken before throwing, as agitation causes the formation of an emulsion in which the droplets of phosphorus are protected from the air by a covering of water.

1¼-lb. Incendiary Bomb Mk I (Obsolescent)

Data

Weight	1¼ lb.
Filling	Incendiary mixture
Delay	5 sec.
Color	Red

Description: The empty bomb consists of a cylindrical tin-plate body which has an externally threaded neck, bakelite adapter and safety cover, zinc-alloy cap chamber, tin-plate cup securing cap chamber, and rubber washer. The body is filled with an incendiary composition and an ignition system which comprises an igniter unit and fuse assembly.

The fuse assembly consists of a rim fire cap secured to a length of safety fuse, which should give a delay of approximately five seconds. The cap chamber is passed over the safety fuse on to the sleeve of the rim fire cap. A length of copper tube is positioned over the fuse and secured by crimping. The igniter unit consists of igniter composition housed in a tin cup. On top of the igniter composition is a primed cambric disc and a paper sleeve.

To assemble the whole ignition system, the fuse assembly is inserted through the bakelite adapter and the free end of the fuse tube is secured to the paper sleeve in the igniter unit. The cap chamber of the ignition system is secured in position by screwing the cup securing cap chamber onto the adapter. The adapter with complete ignition system is screwed on to the neck of the bomb body, the igniter unit positioning itself in the paper cup in the body. The safety cover is screwed down to the rubber washer, housed in the adapter recess, thus forming a seal. A patch of adhesive tape is affixed to the adapter and safety cover. This prevents removal of the safety cover during transit.

Operation: Remove the adhesive tape and safety cover. Place the bomb on its base in the required position. Strike the cap with a hard surface. The bomb is not to be touched after striking the cap.

Part 6—LAND MINES AND FUZES

Chapter 1

INTRODUCTION

General

British mine-warfare policy is nearly identical to American policy in all major respects. The British employ anti-tank and anti-personnel mines according to the demands of the situation. The available information on these types of mines and their fuzes is presented in this section. Each fuze is discussed under the mine with which it is used. The "Hawkins" Grenades No. 75 Mks I-III, which are commonly used as land mines, are discussed under Part 5, chap. 3, Anti-Tank Grenades.

Designation

The British designation of their land mines is slightly irregular. The anti-tank mines are generally designated by a "Mark" in Roman numerals, which corresponds to the U.S. Navy "Mark", and is preceded by the letters "G.S." or "E.P." Two practice anti-tank mines are designated by "Number" instead of "Mark". Anti-personnel mines vary considerably in the form of their designation, but are most commonly designated by "Mark", "Number", or both "Number" and "Mark".

Construction

Anti-tank mines generally are of simple construction, consisting of an explosive-filled body containing a fuze housing, and a pressure plate or spider, which fits over the top of the body.

Anti-personnel mines vary widely in construction and are of greater complexity than the anti-tank mines.

Filling

TNT and Baratol are the explosive fillings most commonly used in anti-tank mines, while anti-personnel mines may employ TNT, Ar[illegible]tol, Gelignite, Pentolite 50/50, and RDX/TNT 50/50.

Color and Markings

Land mines are usually olive drab in color and have the mine designation, filling, date of filling, etc. stencilled on the body.

Special markings and coloring are used in some cases.

ANTI-TANK MINES AND FUZES

A./T. Mine G.S. Mk II (Obsolete)

Data

Diameter .....7½ in.
Height .....3¼ in.
Total weight .....8½ lb.
Explosive weight.....4 lb.
Explosive.....TNT or Baratol
Material..... Steel
Color.....Sides and top dark green; bottom yellow, with cross of red and green
Fuzing.....A./T. Contact Mine Fuze No. 1 Mk II
Pressure required.....350 lb. (approx.)

Description: The Mine G.S. Mk II has three main components: loaded body, cover, and fuze. The mine cover fits over the body and is supported by a leaf spring. Pins on the sides of the mine body engage bayonet sockets in the cover. The cover of this mine must never be removed after the mine is armed. Words to that effect are stamped on the cover of the mine.

The mine body is cylindrical in shape. Passing through the center of the mine is a cavity for the insertion of the mine fuze. During ordinary shipping and storage, this cavity is closed by a shipping plug. A booster charge in a ring-shaped container is placed in this central cavity. The remainder of the mine is filled with the explosive main charge. The mine is fired when the weight of a vehicle overcomes the leaf spring under the cover and allows the cover to force down the top of the fuze.

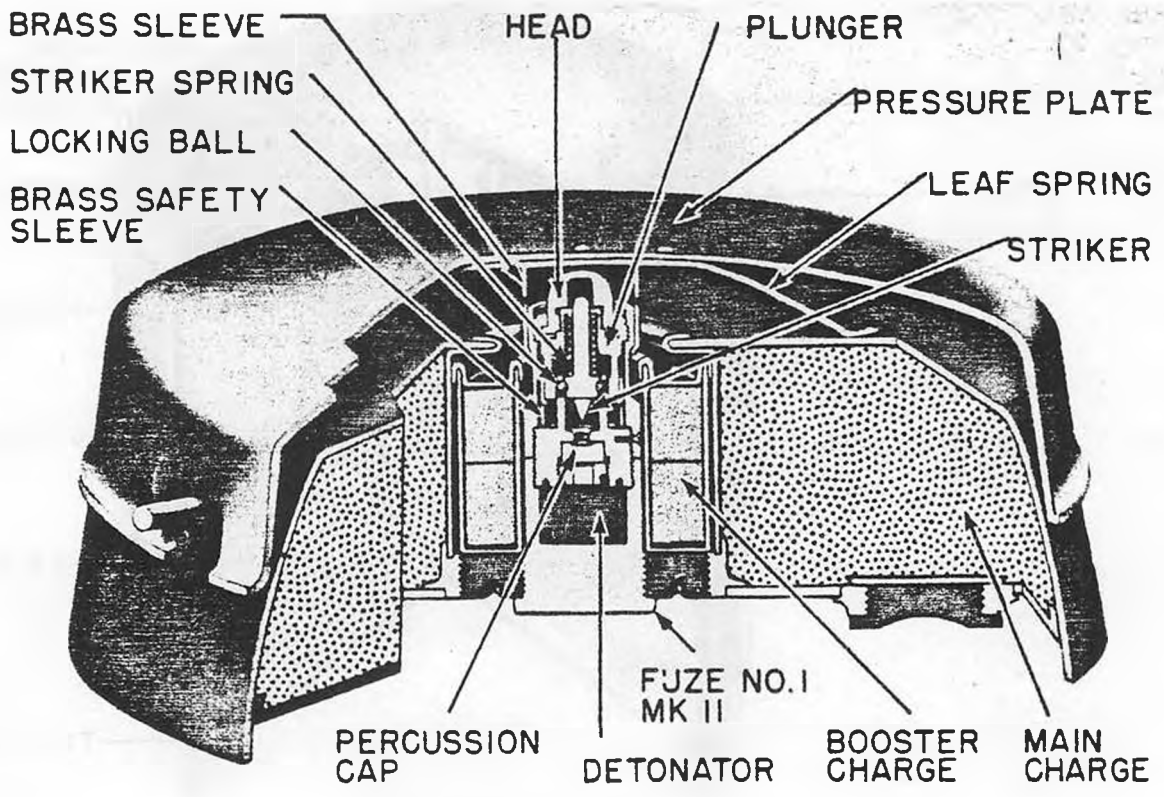


Figure 253—A./T. Mine G.S. Mk II

The A.T. Contact Mine Fuze No. 1 Mk II operates on the ball-release principle, and consists of a cylindrical body containing a striker mechanism, a brass safety sleeve, a percussion cap, and a detonator. Over the top end of this fuze is crimped a thin-walled brass sleeve. Four prongs on a brass safety sleeve retain a plunger in which are located a striker and striker spring. The striker is retained by two locking balls, which are held engaged in a groove in the striker by the plunger. A pressure head is fitted to the top of the plunger.

Pressure on the cover of the mine crushes the thin-walled brass sleeve and forces the pressure head and plunger downward. The four prongs on the brass safety sleeve release their grip, and the striker spring is compressed. The locking balls are forced outward into a recess in the plunger, and the striker fires the percussion cap which explodes the detonator.

Use: This mine is used as a defense against armored cars, tanks, or other vehicles. The mine will break tracks of light and medium tanks, and disable other vehicles.

Assembly and Arming: Place the mine on its edge and unscrew the shipping plug from the center of the bottom of the mine body. Remove the fuze from its cardboard container and screw it into the mine finger-tight. Place the mine in its hole cover side up.

Neutralization: To neutralize the mine, reverse the arming procedure outlined above.

Remarks: If mine is to be re-used, inspect the fuze to see that the thin-walled brass sleeve has not been crushed.

A./T. Mine G.S. Mk III (Obsolete)

Data

Diameter	6 in.
Height	5¼ in.
Total weight	5 lbs. 10 oz.
Explosive	TNT
Material	Body, tin plate; cover, steel

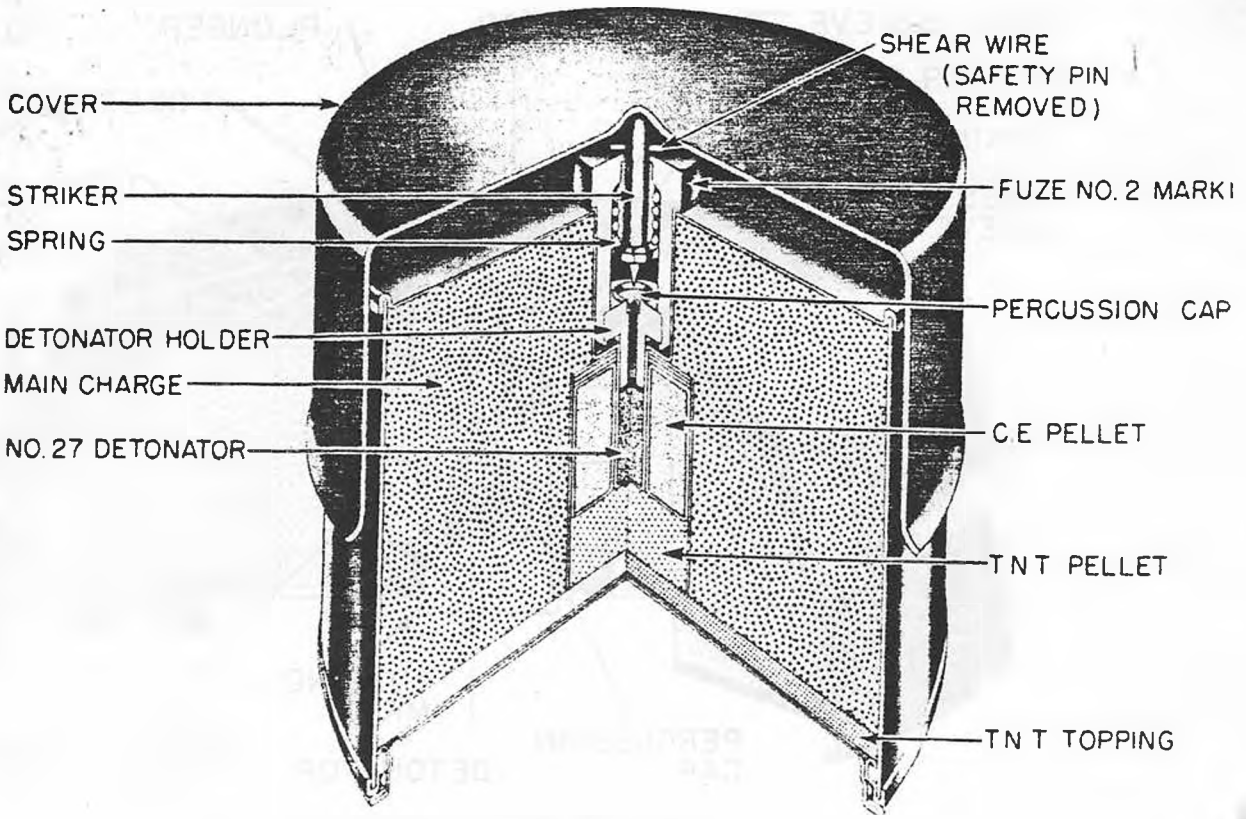


Figure 254—A./T. Mine G.S. Mk III

Color .....Khaki
Fuze...A./T. Contact Mine Fuze No. 2 Mk I
Pressure required.....350 lb.

Description: The Mine G.S. Mk III has three principal components: the loaded mine body, the mine cover, and the fuze. The mine cover fits loosely over the top of the body when the mine is laid, and is raised slightly at the center to form a seating for the top of the fuze. For transit purposes the cover fits over the bottom of the mine and is secured with adhesive tape.

The loaded mine body is cylindrical in shape and is closed at the top with a lid soldered in place. After filling, the bottom of the mine body is closed with a base plate, which is pressed in and coated with cement for moisture-proofing. A central well in the mine body is provided for the insertion of the fuze. Immediately below the fuze well is located a C.E. booster pellet surrounding the Detonator No. 27, and below that is placed a solid TNT pellet.

The A./T. Contact Mine Fuze No. 2 Mk I consists of a brass housing tube containing a spring-loaded striker retained by a shear wire. A brass detonator holder is burred into the lower portion of the housing tube. This holder contains a 1.7-grain percussion cap, below which is located a fire channel leading to the Detonator No. 27. The detonator is crimped over the outside of the holder.

The mine is fired when the weight of a vehicle forces the cover against the striker, shearing the shear wire, and allowing the striker to be forced by its spring against the percussion cap, thus initiating the explosive train.

Use: This mine is used as a defense against armored cars and other vehicles. The mine will break the tracks of light and medium tanks, and disable other vehicles.

Assembly and Arming: Place the mine in the ground and insert the fuze in the fuze well. Withdraw the safety pin from the fuze, and place the cover of the mine over the fuze.

Neutralization: Reverse the arming procedure outlined above.

Remarks: If the mine is to be re-used, inspect the fuze to see that the shear wire is intact and in position.

A./T. Mine G.S. Mk IV (Service)

Data

Diameter .....8 in.
Height .....5 in.
Total weight .....12½ lb.
Explosive weight .....8¼ lb.
Explosive.....TNT or Baratol
Material ..... Steel
Color .....Olive drab
Fuze....A./T. Contact Mine Fuze No. 3 Mk I
Pressure required .....350 lb.

Description: The Mine G.S. Mk IV has three principal components: the loaded mine body, the pressure plate, and the fuze. The pressure plate covers the entire top of the mine and is attached to the mine body by four pins, which engage in four slots in metal clips attached to the body. During normal shipment and storage, adhesive tape binds the pressure plate to the mine body.

The mine body is cylindrical in shape and contains a central well for the insertion of the fuze. Between the central well and the outside casing of the mine is located the explosive main charge.

The A./T. Contact Mine Fuze No. 3 Mk I operates on the shear-pin principle, and consists merely of a spring-loaded striker retained by a shear wire. Below the striker is located a percussion cap and detonator inserted in two C.E. booster pellets. All components—striker mechanism, cap and detonator, and booster—are contained in the fuze body.

Pressure on the pressure plate forces the striker through the shear wire, and the striker spring then forces the striker into the percussion cap, firing the mine.

Use: This mine is used as a defense against armored cars, tanks, and other vehicles.

Assembly and Arming: Remove the adhesive tape binding the pressure plate to the mine body, and then remove the pressure plate. Place the mine in the ground and remove the paper seal from the fuze well. Inspect the fuze to make certain that the shear pin is in position, and then insert the fuze and remove the safety pin. Replace the pressure plate. Do not use force when attempting to remove the safety pin. If it does not come away easily, discard the fuze.

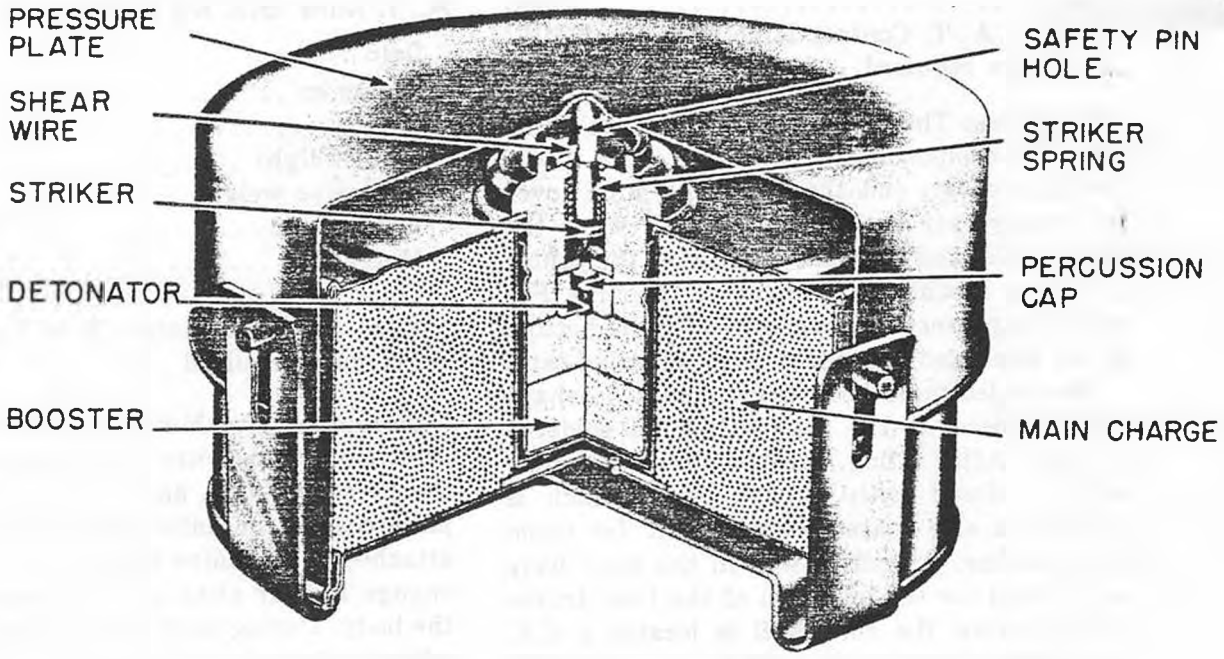


Figure 255—A./T. Mine G.S. Mk IV

Neutralization: To neutralize this mine, remove the pressure plate and insert a safety pin in the safety-pin hole in the striker. Remove the fuze from fuze well. Lift the mine from the ground and replace the pressure plate.

Remarks: If mine is to be re-used, inspect the fuze to make certain that the shear pin is in position and has not been cut or partially cut.

A./T. Mines G.S. Mks V and VC (Service)

Data

Diameter .....8 in.
Height.....4 in. without spider
Total weight.....12½ lb.
Explosive weight .....8¼ lb.
Explosive.....TNT or Baratol
Material ..... Steel
Color .....Olive drab
Fuzing..A./T. Contact Mine Fuze No. 3 Mk I
Pressure required.....350 lb.

Description: The Mine G.S. Mk V has three main components: the loaded mine body, the fuze, and the spider. Attached to the mine body are four metal clips with bayonet joints, which engage the pins on the spider.

The mine body is cylindrical in shape and contains a central well for the insertion of the fuze. During normal shipping and storage this well is closed at the top by a pressure cap. A rubber washer, on which rests the pressure cap, is located on the top of the mine around the fuze well.

A./T. Contact Mine Fuze No. 3 Mk I operates on the shear-pin principle, and consists merely of a spring-loaded striker retained by a shear pin. Below the striker in the fuze body is located a percussion cap and detonator, which is inserted into a booster of two C.E. pellets. All components—striker mechanism, cap and detonator, and booster—are contained in the fuze body.

Pressure on the spider is transmitted to the pressure cap, which forces the striker through the shear wire. The striker is then forced by its spring into the detonator, firing the mine.

Use: This mine is used as a defense against armored cars, tanks, and other vehicles. The mine will immobilize tanks and vehicles.

Assembly and Arming: After the mine has been placed in the ground, remove the spider and pressure cap. Inspect the mine fuze to make certain that the shear wire is in place, and then

insert the fuze. Extract the safety pin from the fuze, and replace the pressure cap so that it rests on the rubber washer. Replace the spider, making certain that the pins engage the slots in the clips.

Neutralization: To neutralize this mine, remove the spider and pressure cap and insert a safety pin in the safety-pin hole in the striker head. Remove the fuze from the well. Replace the pressure cap and spider and remove mine from its hole.

Remarks: The Mine G.S. Mk VC is identified with the Mine G.S. Mk IV, and is handled in exactly the same way. However, the Mk VC contains only 4½ lbs. of TNT or Baratol, giving it a total weight of only 8 lb.

If the mine is to be re-used, inspect the shear pin to see that it has not been cut or partially cut. Straighten the clips and make certain that the spider can be fitted over the pressure cap without a strain.

A./T. Mine E.P. Mk II (Obsolete)

Data

Diameter .....10 in.
Height .....4 in.
Explosive weight .....4½ lb.
Material ..... Steel
Fuzing.....Mine Fuze E.P. Mk II

Description: The Mine E.P. Mk II consists of three principal parts: the loaded mine body, the mine cover, and the mine fuzing arrangement. The mine cover is mushroom-shaped and is attached to the mine body by four hooked straps, which engage a wire fastened to the bottom of the mine cover.

The mine body is a mushroom-shaped container with a central fuze well. On the side of the mine body near the base is located a channel which leads into the central well. This channel is closed by a small metal tab during shipment and storage.

The A./T. Mine Fuze E.P. Mk II consists of two separate parts. The first, the plunger sys-

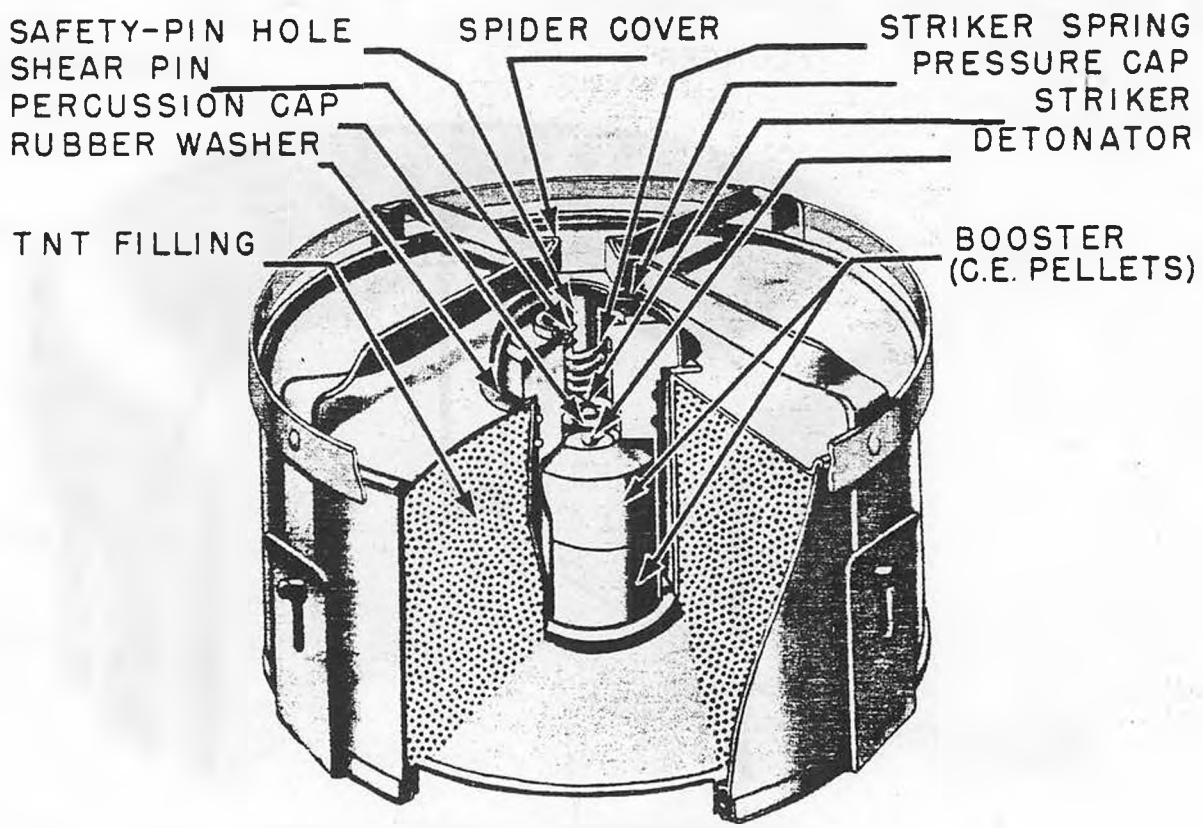


Figure 256—A./T. Mine G.S. Mk V

tem, consists of a plunger inserted into the central well and retained by a shear pin. The second part consists of a detonator and ampoule cartridge inserted in the channel in the side of the mine body and held in position by the metal tab. Pressure on the mine forces the plunger through the shear pin and down against the ampoule cartridge. The cartridge is crushed and causes a chemical reaction, which fires the detonator into which it is inserted. The detonator fires the mine.

Use: This mine is used as a defense against armored cars, tanks, and other vehicles.

Assembly and Arming: Insert the ampoule cartridge, red end first, into the open end of a Detonator No. 8 and seal with luting. Replace the assembly in the detonator box. When ready to lay the mine, remove the steel rod from the hole in the mine body and insert the detonator assembly, ampoule end first, without using force. Bend the metal tab over the end of the assembly and place the mine in the ground.

Neutralization: Mine E.P. Mk II should never be neutralized unless absolutely necessary. They can be disarmed if the detonator assembly will come away easily without using force, but are better destroyed in place.

Remarks: Once laid, these mines are not to be used again even if disarmed.

A./T. Mine E.P. Mk V (Obsolescent)

Data

Diameter	8 in.
Height	2½ in.
Weight	8 lb.
Explosive weight	4½ lb.
Explosive	TNT
Material	Sheet metal
Fuze	Exploder E.P. No. 1 or No. 2
Pressure required	250-350 lb.

Description: The Mine E.P. Mk V consists of three principal components: the loaded mine body, the exploder mechanism, and the mine cover. The cover is fastened to the mine body

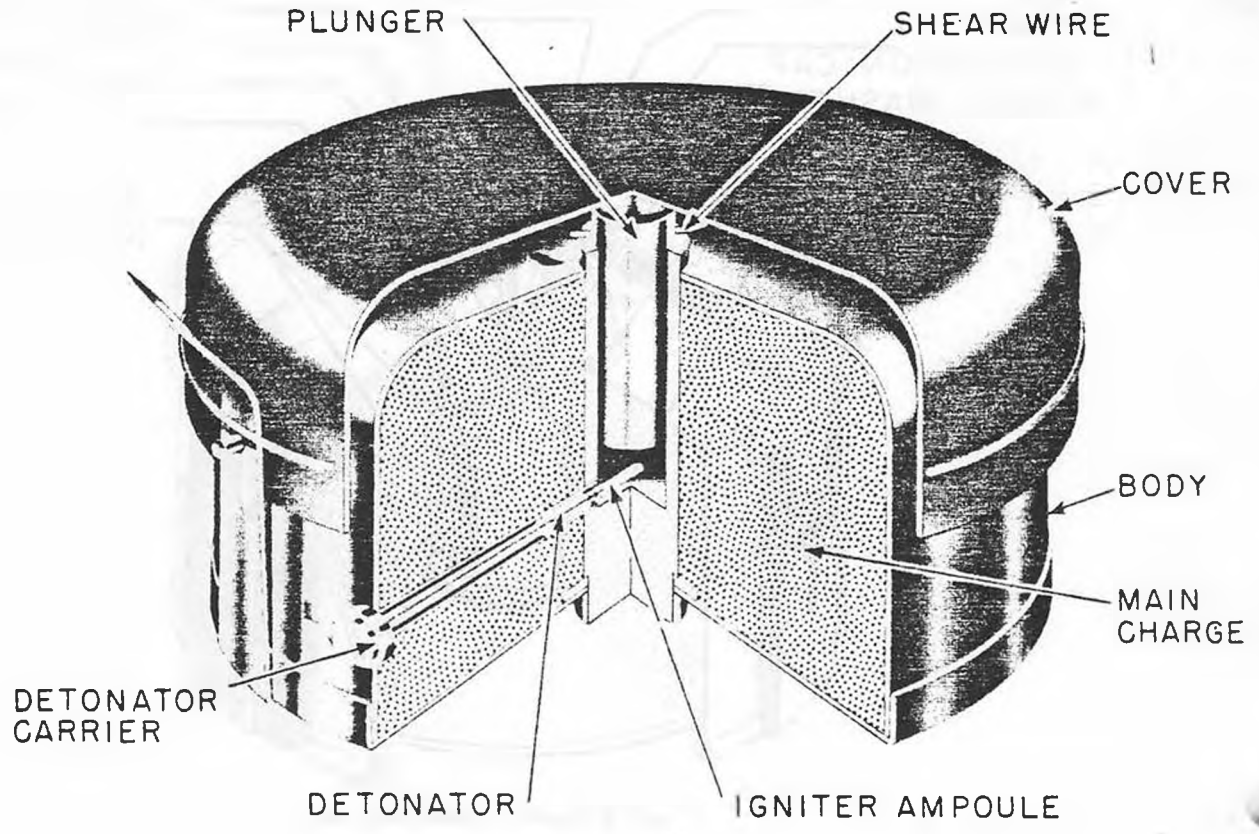


Figure 257—A./T. Mine E.P. Mk II

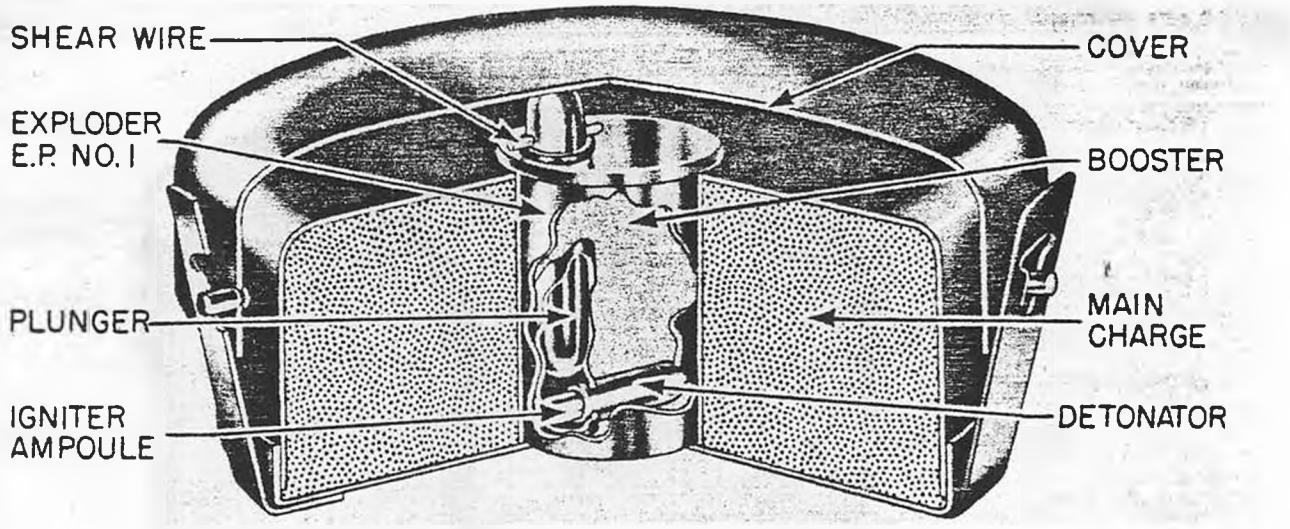


Figure 258—A./T. Mine E.P. Mk V

by three pins, which engage slots provided in three retaining straps attached to the mine body.

The mine body is mushroom-shaped and contains a central well for the insertion of the special exploder.

Exploders E.P. No. 1 and No. 2 function on the shear-wire principle. In effect the exploder is nothing more than a miniature Mine E.P. Mk II. It consists of a fuze body with a well in the top located off-center for the insertion of a plunger, which is packed separately in the same box as the rest of the exploder mechanism. This plunger is retained by a shear wire. In the side of the exploder body, near the base, is a channel for the insertion of the ampoule cartridge-detonator combination.

The fuze functions when pressure on the mine cover forces the plunger through the shear wire and down onto the ampoule cartridge. The ampoule is crushed, causing a chemical reaction which fires the Detonator No. 8. The booster charge, also located in the exploder body, is then detonated, setting off the main charge of the mine.

Use: This mine is used as a defense against armored cars, tanks, and other vehicles. The mine will break the tracks of light or medium tanks and disable vehicles.

Assembly and Arming: Lay the mine in the ground and remove the cover. Place an exploder in the inverted cover (to keep dust, etc., from the plunger), and insert an ampoule, red end first, into a Detonator No. 8. Fill the open end of the detonator flush with luting. Insert this end of the detonator in the hole in the side of the exploder body. Slide the assembly home and seal in place with more luting. Grease the exploder before inserting it in the fuze well of the mine. Refit the cover.

Neutralization: To neutralize this mine, remove the mine cover without putting any downward pressure on the cover, and then lift the exploder from the exploder well of the mine. Remove the plunger from the exploder. Lift the mine and replace the cover.

A./T. Mine E.P. Mk VI (Obsolescent)

Data

Diameter	8 in.
Height	3¼ in.
Weight	8½ lb.
Explosive weight	4½ lb.
Explosive	TNT
Material	Sheet metal
Fuzing	A./T. Contact Mine Fuze No. 3 Mk I
Pressure required	350 lb.

Description: The Mine E.P. Mk VI consists of the following components: loaded mine body, fuze mechanism, and mine cover. The mine cover is fastened to the body by three pins

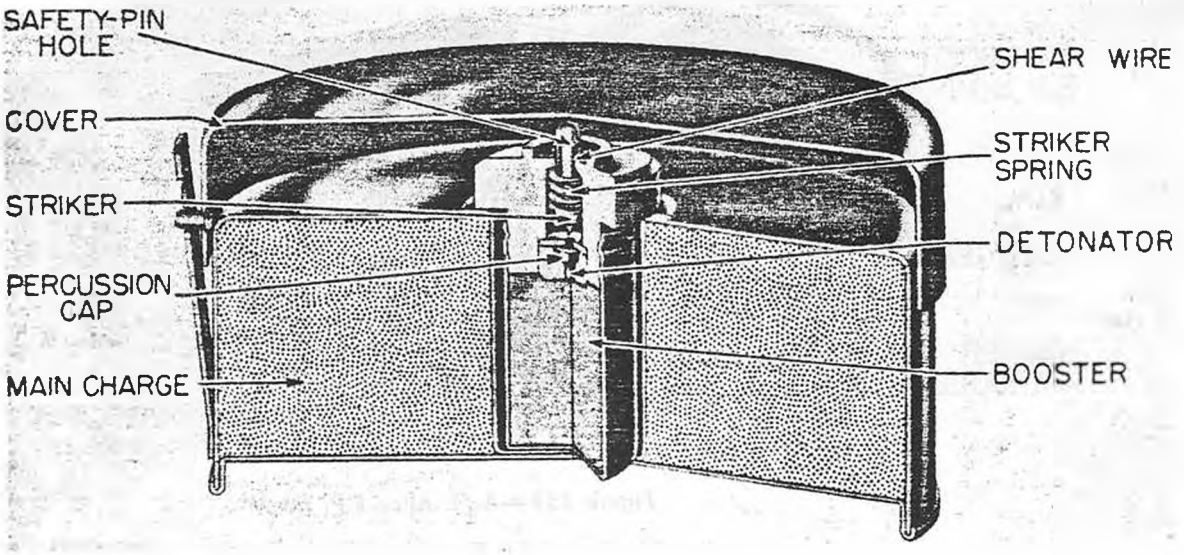


Figure 259—A./T. Mine E.P. Mk VI

which engage slots provided in three retaining straps attached to the mine body.

The mine body is mushroom-shaped and contains a central well for the insertion of the fuze. The mine is similar to the Mine E.P. Mk V, except that the fuze pocket is smaller to accommodate the Fuze No. 3 Mk I, and the Mine Mk VI is slightly heavier.

A./T. Contact Mine Fuze No. 3 Mk I operates on the shear-wire principle, and consists merely of a spring-loaded striker retained by a shear pin. Below the striker is located a percussion cap and detonator inserted in two C.E. booster pellets. All components—striker mechanism, percussion cap, detonator, and booster—are contained in the fuze body.

Pressure on the mine cover forces the striker through the shear wire, and the striker spring then forces the striker into the percussion cap, firing the mine.

Use: This mine is used as a defense against armored cars, tanks, and other vehicles. The mine will break the tracks of light or medium tanks and disable other vehicles.

Assembly and Arming: Remove the m[illegible] cover and place the mine in position in the ground. Inspect the fuze to make certain that the shear pin is in position. Then insert the fuze and remove the safety pin. Replace the mine cover.

Neutralization: To neutralize this mine, remove the mine cover and insert a safety pin in the safety-pin hole in the striker. Remove the fuze from the fuze well. Lift the mine from the ground and replace the mine cover.

Remarks: If the mine is to be re-used, inspect the fuze to make certain that the shear pin is in position and has not been cut or partially cut.

Practice A./T. Mines E.P. No. 2 and No. 3 (Obsolescent)

Data

Diameter	8 in.
Height	2½ in.
Explosive weight	120 grains
Explosive	G-20 gunpowder
Material	Sheet metal
Fuzing	Practice Exploder E.P. No. 1
Pressure required	250-350 lb.

Description: This mine has four principal components: the mine body, the mine cover, the exploder mechanism, and the Thunderflash gunpowder charge. The mine cover is fastened to the body by three pins which engage slots provided in three retaining straps attached to the mine body.

The mine body is mushroom-shaped and contains a central well for the insertion of the special exploder. A hole is drilled in the side of this well near the bottom to allow passage of a short length of instantaneous fuse. Three equi-spaced one-inch holes are drilled in the top of the mine body to provide gas escape vents.

Practice Exploder E.P. No. 1 functions on the shear-wire principle. It consists of a fuze body with an off-center well in the top for the insertion of a plunger, which is retained by a shear wire. In the side of the exploder body near the base is a channel for the insertion of the ampoule cartridge and instantaneous fuse.

The fuze functions when pressure on the mine cover forces the plunger through the shear pin and down onto the ampoule cartridge. The ampoule is crushed, causing a chemical reaction firing the instantaneous red fuse, which, in turn, sets off the Thunderflash.

The Thunderflash is merely a container filled with 120 grains of G-20 gunpowder. It is connected to the exploder by six inches of red instantaneous fuse. The explosion of the fuse and Thunderflash provide a realistic effect for practice purposes.

Use: This mine is used in practice minefields.

Assembly and Arming: Lay the mine in the ground and remove the cover. Inspect the plunger to make certain that the shear wire is intact and in position. Insert the plunger in the hole provided in the top of the exploder and replace the mine cover.

Neutralization: Remove the mine cover and plunger.

Remarks: A./T. Practice Mine E.P. No. 2 is exactly similar to the Mine No. 3 described above, except that a three-foot length of red instantaneous fuse is substituted for the Thunderflash.

Although this mine is not anti-personnel, the charge is by no means harmless, and due precautions should be taken in disarming, especially if the mine has been subjected to blast.

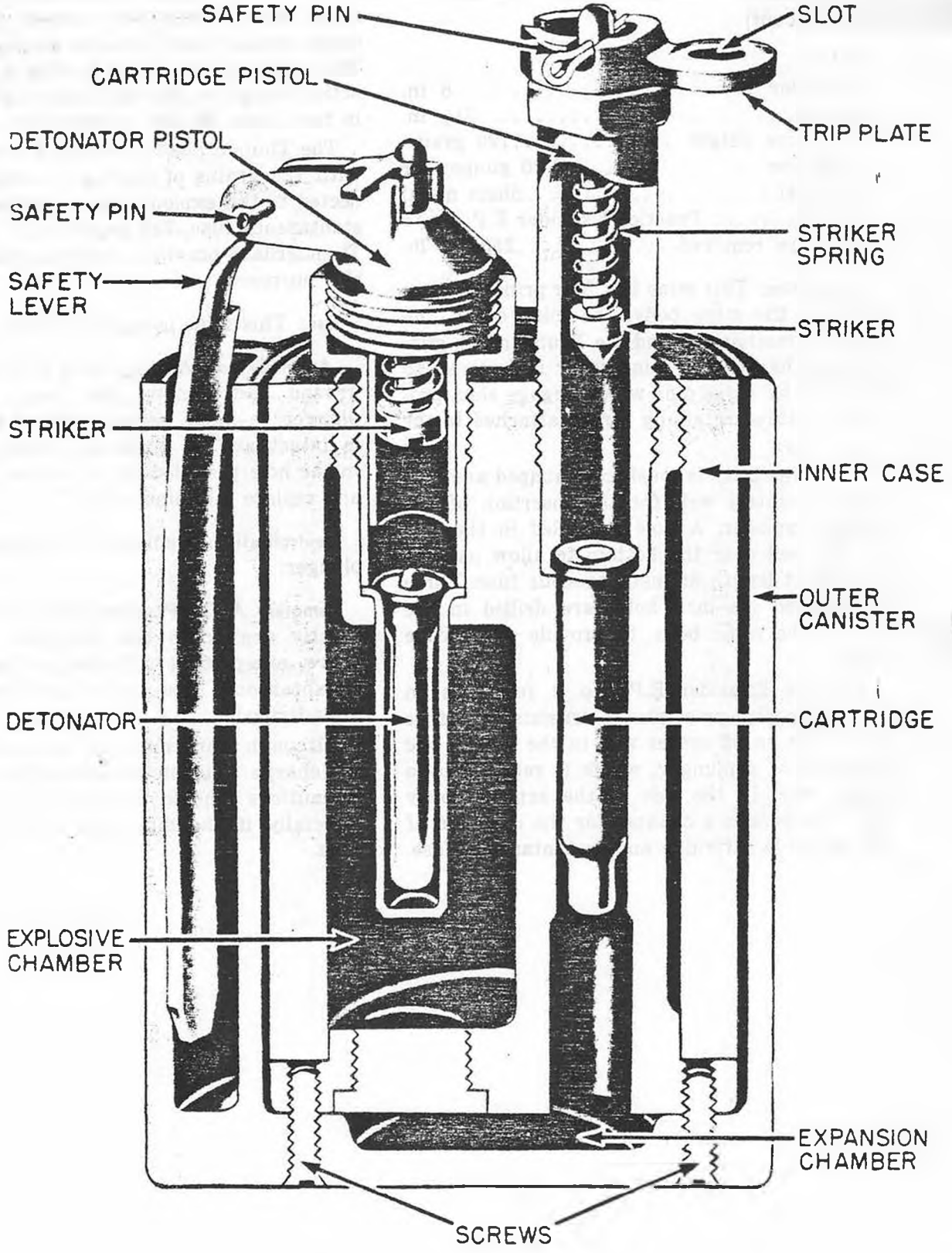


Figure 260—A./P. Shrapnel Mine Mk II

ANTI-PERSONNEL MINES

A./P. Shrapnel Mine Mks I and II

Data

Diameter	3½ in.
Height	5½ in.
Total weight	10 lb.
Explosive weight	1 lb.
Explosive	Amatol
Material	Steel
Color	Yellow
Fuzing	Special fuze
Pull required	4 lb.

Description: The Mine Mk II consists of the following component parts: the outer mine canister, the inner case, the detonator-pistol mechanism, and the cartridge-pistol mechanism.

The outer mine canister is nothing more than a container for the inner case and acts as a small mortar to propel the inner case into the air. The inner case rests on a shoulder in the bottom of the outer canister. Below this shoulder in the canister is a small recess acting as an expansion chamber for the propellant gases. A long recess is located on the outside of the canister to retain the lever of the detonator pistol.

The inner case is a cylindrical container for the explosive charge. Two holes are located in the top of the inner case, one of which passes completely through the case for the insertion of the cartridge pistol, while the other leads into the explosive charge for the insertion of the detonator-pistol mechanism. During normal shipment and storage, the inner case is held in the outer canister by two screws passing through the bottom of the canister into the case. These screws must be removed from the mine before it is laid.

The detonator pistol is the actuating mechanism for the explosive charge of the mine. It consists of a cylindrical body containing a spring-loaded striker retained by a small fork attached to the end of a long lever arm. The lever is held in the retaining position both by a safety pin and a long recess in the outer canister into which it fits. When the lever is released, the striker is forced by its spring into a detonator placed in a well beneath the pistol.

The cartridge pistol is the activating mechanism of the propellant charge of the mine. It consists of a cylindrical body housing a spring-loaded striker. This striker is retained by a fork-shaped trip plate, which fits under a shoulder on the top of the striker and above

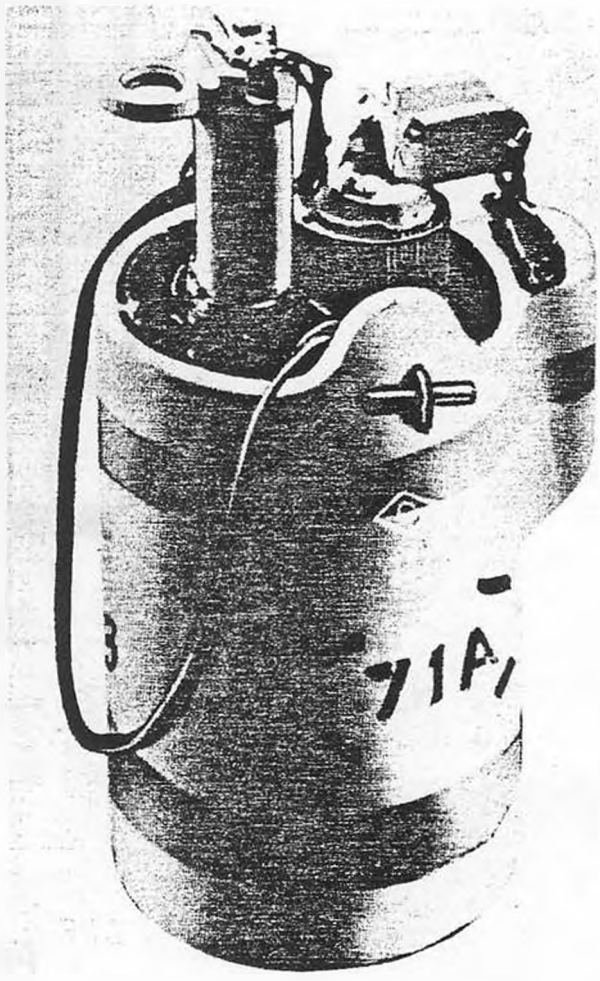


Figure 261—A./P. Shrapnel Mine Mk I

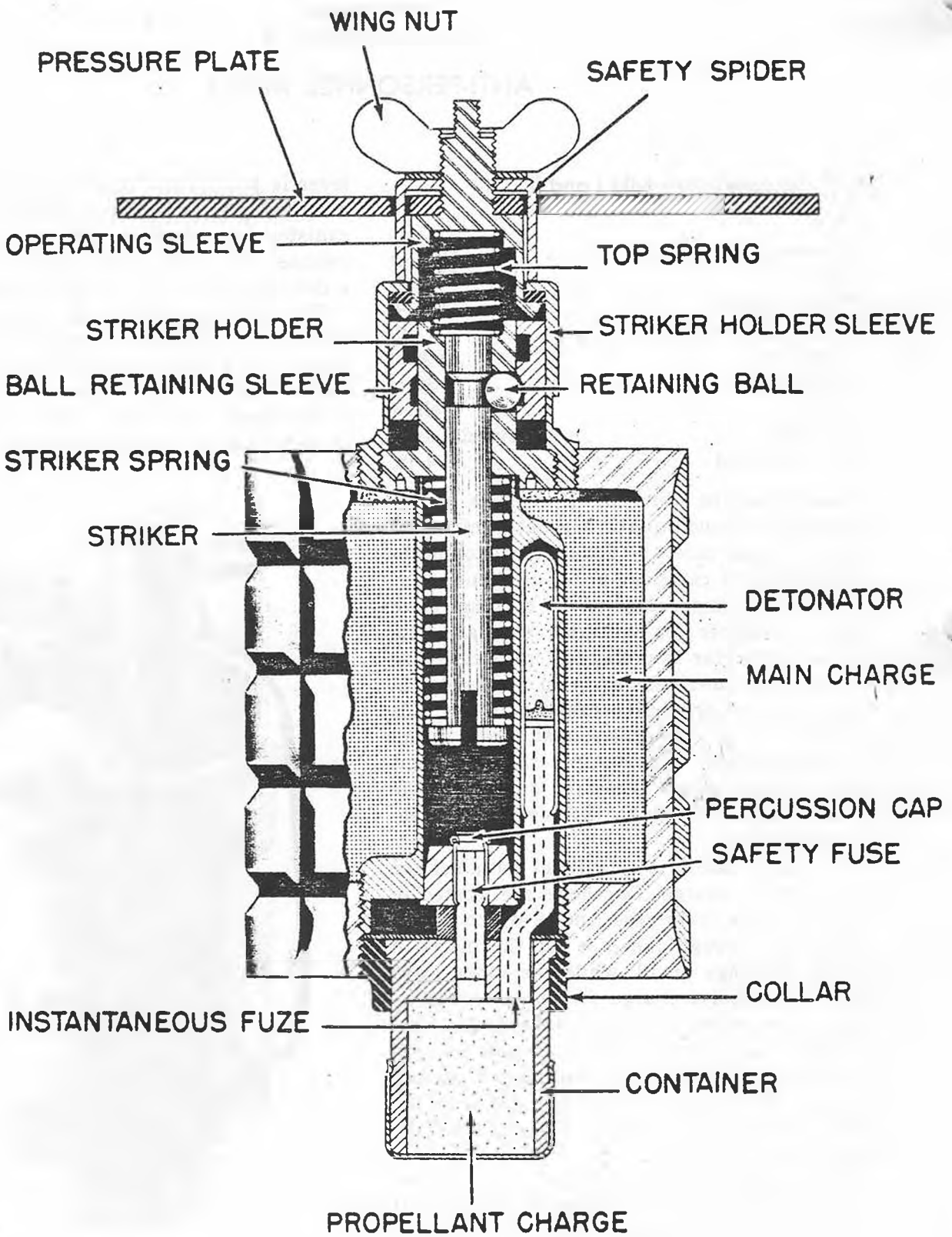


Figure 262—A./P. Mine No. 3 Mk I

the top of the fuze body. A slot for attaching a trip wire is provided in the trip plate. A safety pin passes through the top of the striker and also through a groove cut in the trip plate, thus preventing the trip plate from being withdrawn.

Functioning: A pull of four pounds or more on the trip wire will remove the trip plate from the cartridge pistol, allowing the striker spring to force the striker into the cartridge located beneath the pistol. The explosion of the ballistite cartridge provides the propellant force which throws the inner case into the air. When the inner case leaves the outer canister, the lever arm is released, freeing the striker in the detonator pistol, which then is forced into the detonator located below the pistol. The explosion of the detonator fires the main charge of the mine.

Use: This mine is a bounding anti-personnel mine designed to cause casualties up to 30 yards.

Assembly and Arming: First make certain that the two transit screws holding the inner case in the outer canister are removed. Unscrew the cartridge pistol with the spanner provided. See that cartridge recess is clear and then insert the ballistite cartridge provided with each mine. Replace the cartridge pistol and make certain that the safety pin is secure. Remove the detonator pistol, making certain that the safety pin is in place. Inspect the socket to see that it is clear, and insert the detonator, small end first, so that the cap end rests on a shoulder in the socket. Replace the detonator pistol so that its firing lever engages in the recess on the outer canister. Make certain that the safety pin is secure. Place the mine in the ground and attach a loose trip wire to the cartridge pistol. Remove the detonator-pistol safety pin, and then the cartridge-pistol safety pin. If the latter safety pin cannot be withdrawn easily, release the tension and reset the trip plate.

Neutralization: Replace the cartridge-pistol safety pin, and then replace the detonator-pistol safety pin. Cut the trip wire, and disarm the mine by reversing the procedure for arming.

Remarks: The Mine Mk I is the earlier issue of the shrapnel mine and differs from the Mk II in that the Mk I spring lever is shorter than that provided for the Mine Mk II, and the recess for it in the outer canister does not extend the full length of the Mine. The Mk I mine has a leather carrying strap. The detonator of the Mine Mk I has a slight delay action, while that of the Mk II is instantaneous.

Before re-using a shrapnel mine, test it as follows: After disarming the pistols, lift the mine and examine externally. In removing the cartridge and detonator, note any tendency to stick. If either cartridge or detonator cannot be removed, discard the mine. Examine the cartridge and detonator for corrosion. Examine the empty pistol sockets, and cartridge and detonator recesses for corrosion and wetting. The detonator socket particularly should be examined for blue or green incrustation. If found, discard the mine. Test some of the removed ballistite cartridges and detonators by firing separately.

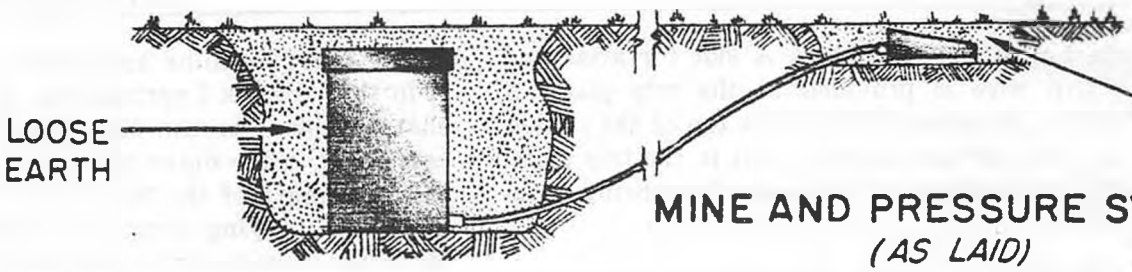
A./P. Mine No. 3 Mk I (Obsolescent)

Data

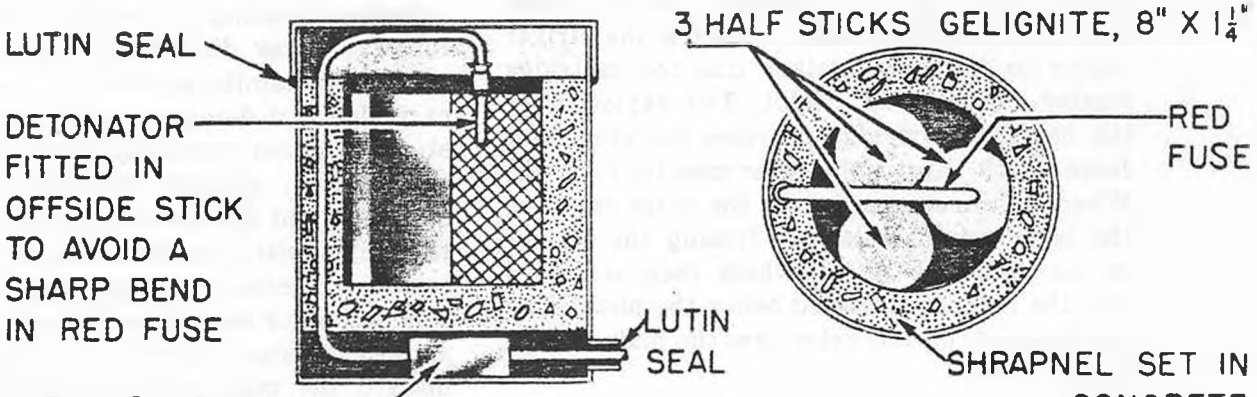
Diameter	2½ in.
Height	6⅛ in.
Explosive weight	3½ oz.
Explosive	TNT
Material	Steel
Color	Black
Markings	½-in. ring of red crosses near top; ½-in. green ring near base
Fuzing	Special fuze
Pressure required	At center of plate, 38 lb.; at edge of plate, 7 lb.

Description: The Mine No. 3 Mk I has four principal components: the loaded mine body, the pressure plate, the special percussion fuze, and the base propellant charge. The pressure plate is a steel disc, four inches in diameter, threaded to the top of the fuze mechanism.

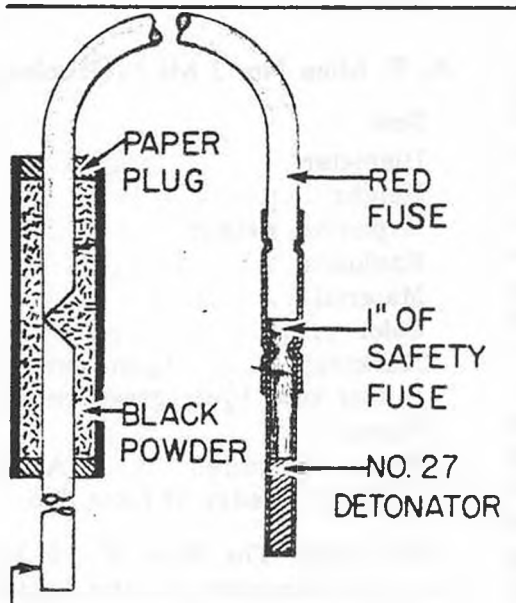
The mine body consists of a cylindrical, corrugated-steel outer casing containing the explosive main charge, and a central tube, threaded into the base of the mine body for the insertion of the fuze mechanism and the propellant charge. A long tubular recess is provided in one side of the center tube for the



MINE AND PRESSURE SWITCH
(AS LAID)

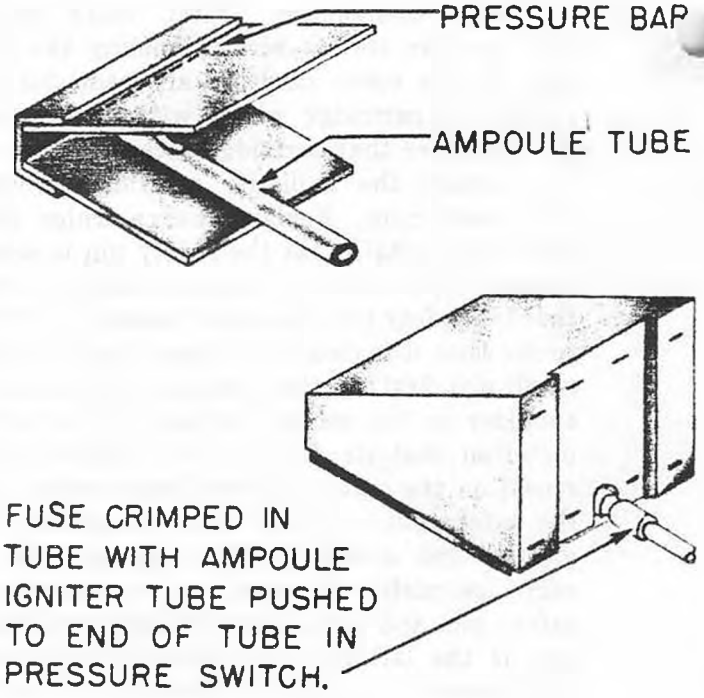


CHARGED READY FOR USE



END SEALED WITH FUSE SEALING COMPOUND. CUT OFF ½" LENGTH OF FUSE BEFORE USING.

FUSE UNIT NO. 1
(AS ISSUED)



PRESSURE SWITCH
E.P. NO. 1, IN FIRING POSITION

Figure 263—A./P. Mine E.P. No. 4

insertion of the instantaneous fuse and detonator.

The fuze mechanism consists of a striker holder sleeve, one end of which is threaded into the top of the mine, while the other end is crimped over to retain the operating sleeve. Threaded to the inside of the striker holder sleeve is the tubular striker holder. The striker rides in this holder, and the striker spring abuts against the lower edge of the holder.

In the upper part of the striker holder are three retaining balls, which engage a groove in the striker, and retain it in the cocked position. The balls are kept from moving outward by the ball-retaining sleeve. Two annular grooves are cut on the inside of the ball-retaining sleeve. The upper groove is deep and the lower one shallow. In the cocked position, the retaining balls ride in the lower groove, which is shallow enough to force the balls into the striker groove, but sufficiently deep to prevent the ball-retaining sleeve from moving freely inside the striker-holder sleeve. Immediately above, and resting on the retaining sleeve, is the operating sleeve. This sleeve is held upward by the top spring, but is prevented from being forced out of the fuze by the turned edges of the striker-holder sleeve. The top of the operating sleeve is threaded to receive the pressure plate.

A safety spider with four prongs slips over the threaded part of the operating sleeve, and the prongs pass through four holes in the pressure plate and bear against the top of the stricker-holder sleeve. A wing nut holds the safety spider securely in position. When the safety spider is in position, the operating sleeve is prevented from moving, thus making the mine safe. The safety spider and wing nuts are removed when the mine is armed.

The fuze functions when sufficient pressure is placed on the pressure plate to tilt or force the operating sleeve downward. This, in turn, forces the ball-retaining sleeve down until the retaining balls can move into the deep upper groove. The striker is then released and initiates the explosive system.

The base assembly consists of a threaded collar into which is fitted the propellant-charge container. This container holds a charge of about 100 grains of G-20 Gunpowder, and is closed at the bottom by a cup, which is crimped into a groove on the outside of the container. Two holes are drilled in the top of the container and lead directly to the gunpowder charge. The first hole contains a short length of safety fuse, which leads to the percussion cap and priming composition. The second hole contains one end of the length of instantaneous fuse to which the detonator is crimped. Between the detonator and the instantaneous fuse are about 2½ grains of sulphurless meal powder, which provides a slight delay.

Functioning: When the striker hits the percussion cap, the safety fuse is ignited and burns from 1 to 2 sec., allowing sufficient time for the enemy to move forward and remove his foot from the mine. The flash from the safety fuse ignites the propellant charge and projects the mine into the air. Simultaneously, the flash from the gunpowder ignites the instantaneous fuse, which fires the detonator when the mine is about 2 to 4 feet in the air.

Use: This mine is a bounding anti-personnel mine. The effective lethal range is estimated at 30 yards radius.

Assembly and Arming: Place the mine in the ground on a drilled block of wood to provide support. Pack earth around the mine, and then remove the wing nut and safety spider, being careful not to exert any pressure on the pressure plate.

Neutralization: Reverse the process outlined for arming the mine.

Remarks: This mine was developed and produced by the Royal Engineers in India.

A./P. Mine E.P. No. 4 (Obsolete)

Data

Diameter .....2⅞ in.
Height .....4 in.
Weight .....1 lb. (approx.)
Explosive weight.....¾ lb
Explosive.....3 sticks of Gelignite, each 4 in. x 1¼ in. diameter
Material .....Sheet metal
Fuze.....Fuze Unit No. 1, with any pull or pressure switch, or with Pressure Switch E.P. No. 1.

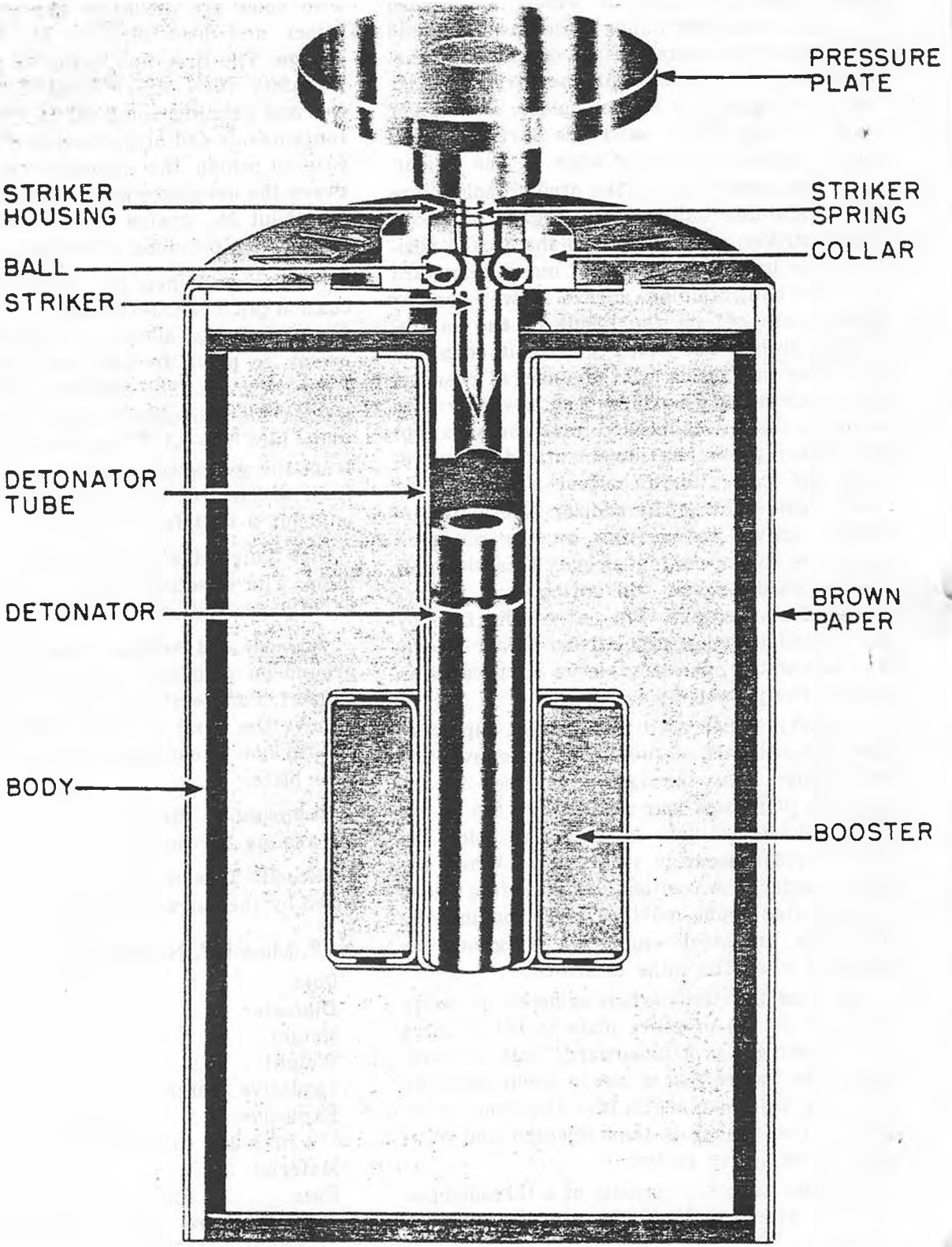


Figure 264—A./P. Mine No. 5 Mk I

Description: The Mine E.P. No. 4 consists of three component parts: the outer mine canister, the inner loaded mine case, and the special Fuze Unit No. 1.

The outer canister consists of a cylindrical sheet metal container for the inner loaded case. The outer canister acts as a mortar from which the inner case is projected. A short tube projects from one side of the outer container near the bottom. The instantaneous fuse passes through this tube to the switch, when the mine is laid. The top of the outer canister is closed by a lid.

The inner loaded mine case contains shrapnel set in concrete around the sides and bottom. In the center of the case are located three sticks of Gelignite, which comprise the main explosive charge. Near one edge of the inner case is located a hole to allow passage of the instantaneous fuse.

The Fuze Unit No. 1 consists of a length of instantaneous fuse. Toward the center of this length of fuse is fixed a charge of black powder, which serves to propel the bomb from the container. A Detonator No. 27 is crimped to one end of the length of fuse. A one-inch length of safety fuse intervenes between the detonator and the instantaneous fuse to provide the necessary delay. The other end of the instantaneous fuse is led through the tube in the base of the outer canister to the initiating switch. The fuze unit is shipped in the bomb, but is not assembled.

Functioning: Operation of the switch initiates the red instantaneous fuse. The red fuse ignites the black powder charge, which blows the inner mine case out of the canister, and then flashes on to ignite the safety fuse delay. The safety fuze allows the bomb to fall back to the ground before detonating.

Use: This mine is a bounding shrapnel mine designed for anti-personnel purposes. When the mine is fired, the bomb jumps from its container, comes to rest on the surface of the ground, and explodes.

Assembly and Arming: Remove the lid from the mine, and withdraw the fuze unit and the inner case. Thread the detonator end of the fuze unit through the hole in the inner case. Thread the other end through the hole in the outer canister and draw it all the way through, lowering the inner case gently into the canister. Attach the trip or pressure mechanism to the fuze unit. Charge the bomb with three sticks of Gelignite; insert the detonator into one stick; and replace the lid of the mine.

Neutralization: Cut the red instantaneous fuse at the most convenient place. Neutralize the switch. Remove the lid from the outer canister and pull the detonator from the charge. Remove the inner case from the container and unthread the fuze unit.

Remarks: Although any British switch may be used with this mine, the switch designed especially for it is the Pressure Switch E.P. No. 1. This switch consists merely of two steel plates, which are hinged together. The upper plate carries a pressure bar, which, when the plates are forced together, crushes a chemical igniter ampoule contained in a tube on the lower plate. The end of this tube is open and is of suitable diameter to accept instantaneous fuse. The fuse is inserted as far as possible, and then crimped in place.

A./P. Mine No. 5 Mk I (Service)

Data

Diameter ..... 2 in.
Height ..... 3⅝ in.
Explosive weight ..... 6¾ oz.
Explosive ..... 50/50 Pentolite or 50/50 RDX/TNT
Material ..... Cardboard
Color ..... Brown
Fuzing ..... Special fuze
Pressure required ..... 6-12 lb. (approx.)
Markings ..... Red band around base; black band between two green bands around center when Pentolite filled; single blue band at center when RDX/TNT filled.

Description: The mine consists of two principal components: the loaded mine body and the fuze mechanism.

The mine body consists of a cardboard cylinder and ends, containing the explosive main charge. A central well is provided for the insertion of the fuze. A 5-dram perforated C.E.

pellet booster is placed around the lower portion of the central well.

The special fuze uses a waterproof igniter unit, the Detonator No. 89 Mk I, which consists of a 1.7-grain igniter cap spun into the open end of a Detonator No. 8 or No. 27. A hollow ebonite rod containing a spring-loaded striker comprises the striker unit. The striker is retained by two retaining balls, which are held engaged in a groove in the striker by a collar fitting over the outside of the rod. The fuze functions when sufficient pressure is exerted on top of the igniter to force the rod down through the collar and release the retaining balls. This fuze unit is packed separately from—but in the same crate as—the mines in which it is to be used. During normal shipment and storage the mines have a wooden plug in the fuze well.

Functioning: Sufficient pressure on the fuze forces the rod down through the collar and releases the retaining balls. The spring-loaded striker is freed to initiate the explosive train.

Use: This mine is a non-metallic anti-personnel mine, designed to prevent detection by means of mine detectors. The only metallic parts used in its construction are the detonator, spring, balls, and striker.

Assembly and Arming: Place the mine in the ground. Remove the wooden plug from the fuze well and insert the Detonator No. 89 provided. Check the striker unit to make certain that it is properly assembled, and insert the striker unit in the fuze well above the igniter unit. Be careful to exert no pressure on the striker unit once it has been inserted in the mine.

Neutralization: To neutralize this mine, carefully remove the striker unit, lift mine, and remove detonator-igniter unit.

Remarks: Due to the non-metallic construction of this mine and the small area, it will be very difficult to detect this mine either with detectors or by probing.

Because of the small effective pressure area of the striker unit, it is recommended that this area be increased by placing a small piece of wood, etc., above the striker after laying. A circular steel pressure plate is provided with the later issues of this mine. The pressure plate has a small bush on its under surface, which fits over the top of the ebonite striker housing. The use of this pressure plate will eliminate the non-detectable feature of the mine, but will increase the operating efficiency by increasing the pressure area.

A./P. and Anti-Tire Mine (Service)

Data

Diameter	2 in.
Height	1⅛ in.
Total weight	5 oz.
Explosive weight	2 oz.
Material	Steel
Color	Unpainted steel
Fuzing	Special
Pressure required	25 to 75 lb.

Description: This mine resembles a small, round, tin ointment box, and consists of two telescoping steel halves. The smaller bottom half houses the igniter, while the larger top half contains the doughnut-shaped explosive charge, which is glued to the under side of the top with a sticky adhesive substance.

The fuze consists of the brass cap holder, cap holder sleeve, detonator holder, striker, and striker spring. The cap holder is threaded into the base of the lower portion of the mine body and contains the percussion cap. A brass striker, retained by a shear wire, and a striker spring are located in the cap holder sleeve in the lower half of the mine body. Two diametrically opposed detonators are located in the detonator holder. Two blast holes are drilled in the lower portion of the cap-holder sleeve to allow the flash from the percussion cap to contact the two detonators.

Functioning: When the two halves of the mine are compressed, the detonator holder slides down over the cap-holder sleeve, compressing the striker spring. At the same time it forces the striker through the copper shear wire, which passes through the head of the striker and the walls of the cap-holder sleeve. The detonator holder has two diametrically opposed longitudinal grooves, about one third of an inch long, which allow it to slide freely over the

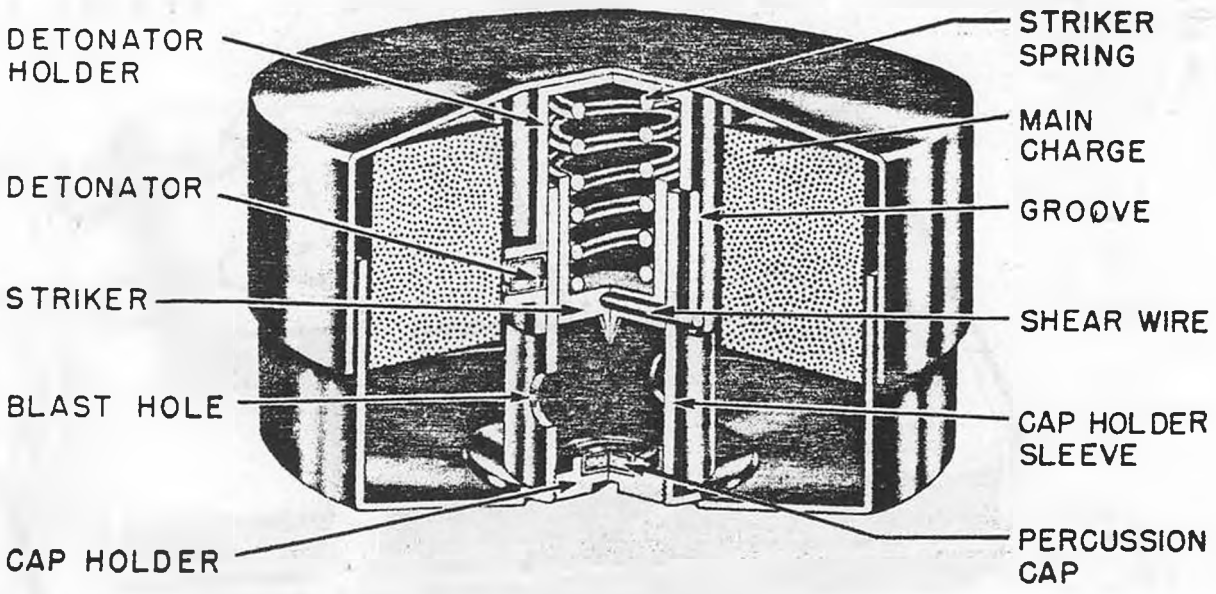


Figure 265—A./P. and Anti-Tire Mine

cap-holder sleeve without interference from the two projecting ends of the shear wire. This also serves to position the detonator holder with reference to the cap-holder sleeve, so that the two blast holes in the latter will be adjacent to the two detonators in the former. When the shear wire is sheared, the spring forces the striker against the cap. The flame escapes outward through the blast holes, exploding the two round detonators and the main charge.

Use: This mine is designed for use by the airborne forces. It will be found laid in fields, along the edges of roads, or in other conspicuous places where the foot soldier or light transport is likely to go. The charge is sufficient to blow off a man's foot or rupture the tire of a vehicle. The mine can easily be detected by any type of mine detector.

Assembly and Arming: Place the detonator holder over the cap-holder sleeve and screw the cap into the bottom half of the mine body. Place the top half of the mine over the bottom half, and lay the mine in the ground.

Neutralization: Reverse the procedure outlined for assembly and arming. This mine has no safety device incorporated in it.

Remarks: This mine has been discovered frequently in France. It was first reported to be of German origin and labeled the "Ointment Box Mine".

Grenade No. 75 Mk I (Adapted for A./P. Use) (Service)

Data

Height	1⅞ in.
Length	6½ in.
Width	3⅝ in.
Total weight	3 lb.
Explosive weight	1½ lb.
Explosive	Nobel's No. 704 or Ammonal
Material	Steel
Color	Buff
Fuzing	Grenade Igniter No. 75 Mk II
Pressure required	10 lb. (approx.)

Description: This grenade is commonly used as an anti-tank mine, but may be adapted for anti-personnel use. A complete description of this mine as normally issued will be found in Part 5, chap. 3, Anti-Tank Grenades. The description which follows will concern only the adaptations made to accomplish an anti-personnel effect.

One striker bracket has been removed and replaced by a small wooden block, as a safety device. This block is temporarily held in position by two thumb tacks through the slots in

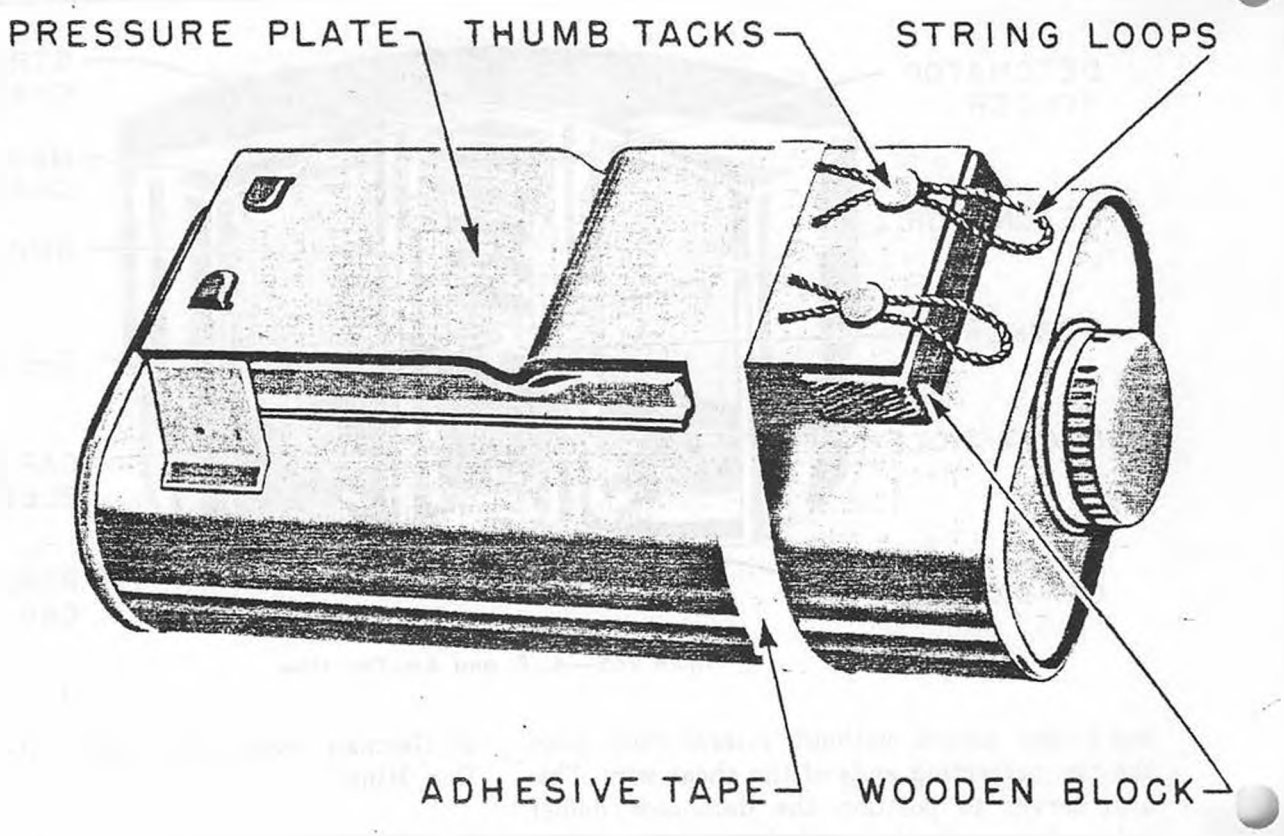


Figure 266—Grenade No. 75 Mk I adapted for A./P. use

the pressure plate provided for the bracket clips. A band of adhesive tape around the whole mine positions the pressure plate.

Use: The mine is used as a blast-type anti-personnel mine. The mine should be laid just below the level of the ground, with a slight covering of soil or foliage for concealment. Care should be taken to ensure that stones or small pieces of wood do not become lodged between the striker plate and the mine body. These mines should not be laid closer together than three feet to avoid sympathetic detonation.

Assembly and Arming: The mine is armed in the usual way. The detonator is inserted in the igniter (open end to open end) and fastened by the rubber tube provided. Insert the complete assemblies into the pockets provided on top of the mine body, with detonator inwards. If armed correctly, the red of the igniter can be seen in the gap in the fuze pocket. Close cover tabs to prevent the detonators from falling out.

Lay the mine in the ground and remove the two thumb tacks by pulling up on the two string loops attached to them. Remove the wooden block. Utmost precaution should be taken to put no pressure on the mine pressure plate after it has been set.

Neutralization: To neutralize this mine, raise the pressure plate and reinsert the wooden block, making it fast with thumb tacks. Open the flaps on the fuze pockets and remove the fuze assemblies. Take the fuze assemblies apart, and store the detonators and igniters separately.

Remarks: The A./T. Hand Grenades No. 75 Mks II and III ("Hawkins" Grenades) can be similarly adapted for anti-personnel use.

Part 7—FIRING DEVICES AND DEMOLITION STORES

Chapter 1

INTRODUCTION

General

British firing devices, referred to as switches, are used to initiate booby traps or, in some cases, demolition charges. Switches generally operate by pull, pressure, release of pressure, or various combinations of these actions. Time or long-delay switches may utilize the corrosive reaction of acid with metal, or lead fatigue to achieve the delay. Many types of improvised switches of both electrical and mechanical types may be constructed from common materials, but are not dealt with in this publication.

Demolition stores include the more common Detonators, primers, instantaneous fuse, safety fuse, detonating fuse, prepared demolition charges, and military explosives used by the British. These stores are used chiefly in demolition work, or in the preparation of booby-trap charges.

Distribution

Switches are ordinarily designated by the "type of action" (pull, pressure, etc.), a "Number" corresponding to the U.S. Navy "Mark", and a Roman numeral "Mark" corresponding to the U.S. Navy "Modification."

The designation of demolition stores varies with the particular item, but usually follows the common "Number" and "Mark" system.

Pull Switch No. 1 Mk 1 (Service)

Data

Diameter .....⅝ in.
Length.....4 in. (with fuse adapter)
Weight .....2¾ oz.
Material ..... Steel
Pull required.....2 lb.
Color .....Olive drab

Description: This switch consists of a housing tube containing a release pin and spring, a plug, a split-headed striker, and a striker spring. In the cocked position, the split head of the striker is spread over the top of the plug by the insertion of the nib on the end of the release pin. The striker is thus held under spring compression. A safety pin is inserted through the housing tube and the release pin, preventing the latter from being disengaged from the split head of the striker.

An anchor bracket is slipped over the housing tube to enable the switch to be anchored in any convenient position, and a screwed collar is threaded over the open end of the tube for attachment of the cap holder.

Functioning: A pull on the trip wire attached to the pull ring removes the release pin from the split head of the striker, which contracts sufficiently to pass through the opening in the plug. The striker spring then drives the striker into the percussion cap.

Use: This is a pull-type firing device used to initiate either booby-trap installations or demolition charges. It is designed to operate when a direct pull is exerted on a trip wire attached to the release pin. It fires a percussion cap in a holder which can be connected either to instantaneous fuse or to a Detonator No. 8.

Installing: Remove the fuse adapter by unscrewing the collar. Anchor the switch by means of the bracket. Replace the collar without the fuse adapter. Install a loose trip wire, and connect the charge to the fuse adapter with detonating cord. Replace the fuse adapter on the switch by means of the collar. Withdraw the safety pin gently. With proper installation, the safety pin should be loose in the safety-pin hole.

Disarming: Insert the safety pin in the safety-pin hole. Cut the trip wire, and remove the fuse adapter.

Remarks: To re-use this switch, make the following test. Unscrew the collar, and remove the fuse adapter. Hold the switch with its open end against a piece of wood. Remove the safety pin and gently pull the release pin. The striker should descend, driving its point well into the wood. To recock, push back the striker with a pencil or other wooden rod until the release pin slips into the split head of the striker and locks it in place. Reinsert the safety pin.

To enable this switch to be used for electric firing when desired, a special electric adapter is supplied. This consists of a small unit made of insulating material and fitted with two contact points, from which are led two lengths of rubber-insulated flexible wire. The contact points are enclosed by a copper cap which is spun in position on the insulating body, and cannot be removed. The unit replaces the percussion cap in its holder. When the striker operates, instead of piercing the percussion cap, it drives down the center portion of the copper cap so that the two enclosed contacts are short-circuited. Visual inspection will indicate whether the copper cap has suffered accidental damage. If it is dented at all, the adapter should be discarded.

To fit an electric adapter, remove the collar from the end of the switch. Remove the percussion-cap holder and insert the copper-capped end of the unit inside the tube. The collar may now be threaded on over the wire leads and replaced. The adapter must be wired in series

with a battery and an electric detonator. Final connection should not be made until the switch has been installed.

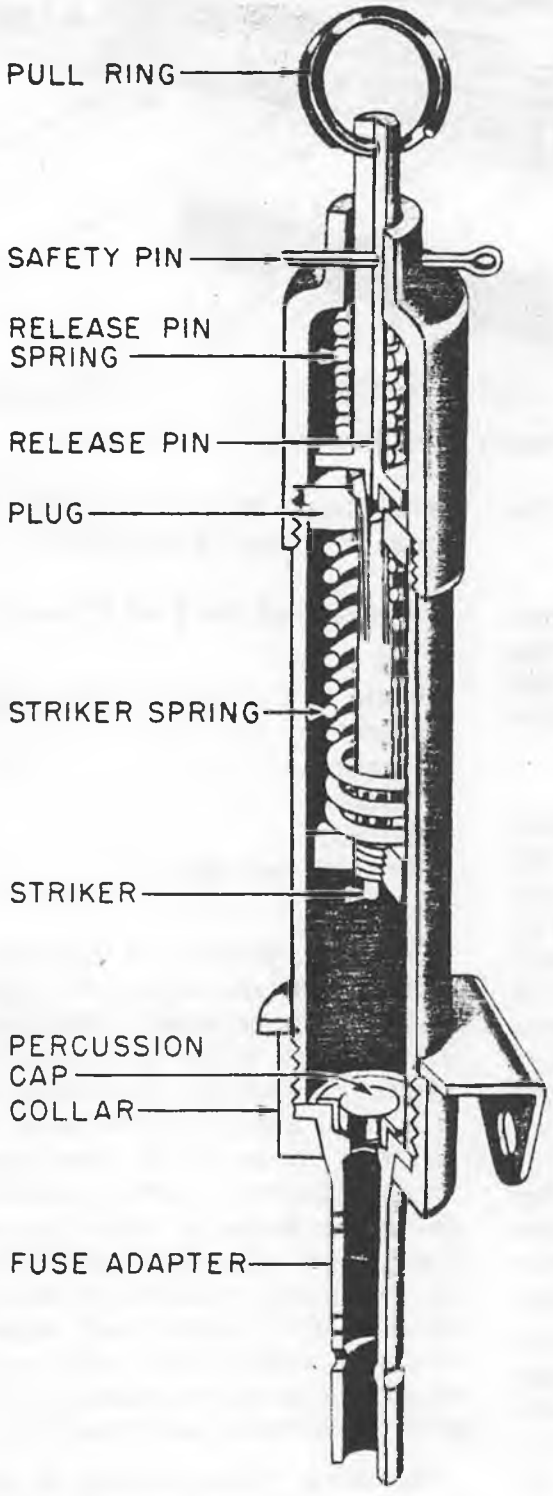


Figure 267—Pull Switch No. 1 Mk I

Pressure Switch No. 2 Mks I and II (Service)

Data

Width .....1½ in.
Height .....1⅛ in. (armed)
Length.....4⅝ in. (with fuse adapter)
Weight .....6 oz.
Material ..... Brass
Pressure required .....30-40 lb.
Color .....Olive drab

Description: The switch consists of a housing tube mounted on a rectangular base plate. Inside the housing tube is located a spring-loaded striker, one end of which passes through the head of the housing tube and is secured by a transverse pin recessed into the end of the head. An annular groove in this striker is straddled by the milled-out end of a shearing stud, which is inserted through a hole in the top of the housing tube and engages the striker with a chisel edge. A flat, disc-shaped pressure head is located on top of the shearing stud. A threaded collar is screwed over the open end of the housing tube for attachment of the cap holder.

A safety pin may be inserted through the shearing stud above the housing tube to prevent the shearing stud from being forced downward.

Functioning: Pressure on top of the pressure head will cause the V-shaped cutting edge of the shear stud to break the striker spindle. The striker, driven forward by the spring, fires the percussion cap.

Use: This switch is used under boards, doormats, etc., in booby-trap installations where initiation by pressure is desired. The switch may also be used to initiate demolition charges.

Installing: Remove the pressure cap from the base plate, to which it is attached during transport. Insert the pressure cap through the hole in the top of the housing tube, and position it to straddle the striker. If properly placed, the pressure cap cannot be rotated. Make certain that the safety pin is securely in position. Unscrew the collar and remove the fuse adapter. Place the switch in position. Connect the charge to the fuse adapter with instantaneous fuse. Re-attach the collar and the fuse adapter, and gently remove the safety pin. If desired, a Detonator No. 8 can be slipped directly into the

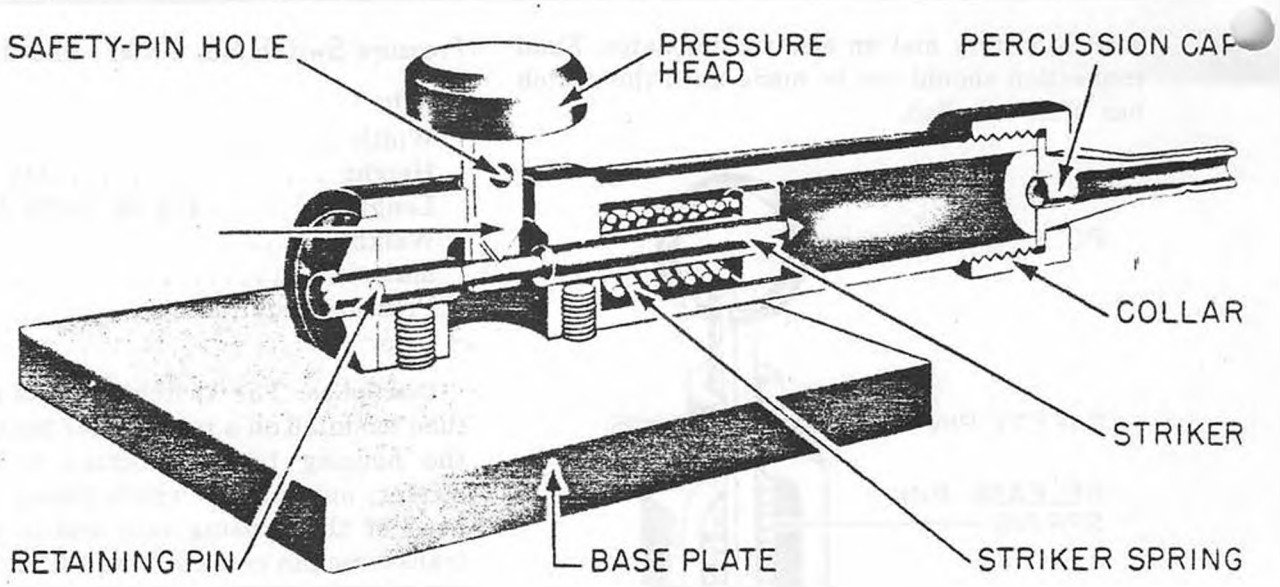


Figure 268—Pressure Switch No. 2 Mk I

fuse adapter, and the connection made to the charge with Cordtex.

Disarming: Insert a safety pin in the safety-pin hole in the pressure cap. Lift the pressure cap out of the housing tube. Cut the length of fuse connecting the switch to the charge. Remove the fuse adapter.

Remarks: The Pressure Switch No. 2 Mk II is almost identical to the Mk I, the principal difference being the fact that the base plate and housing tube are cast in one piece in the Mk II, while in the Mk I they are fastened together with two screws. Also, in the Mk II the hole in the housing tube for the insertion of the pressure cap is surrounded by a raised collar, which contains a rubber washer. The safety pin pierces not only the shearing stud, but the collar and washer as well. The Mk II is issued with the pressure cap in place in the housing tube, rather than secured to the base plate. The alterations incorporated in the Mk II were designed to increase the weather resistance of the switch.

To test the switch prior to re-use, remove the fuse adapter and make certain that the striker is in the cocked position. If the striker spindle has been sheared, the striker will fall out of the housing tube, and the switch cannot be re-used.

A special electric adapter, also used with Pull Switch No. 1 Mk I, is supplied to enable this switch to be used for electric firing, if so desired.

Release Switch No. 3 Mk I (Service)

Data

Width	2 in. (without fuse adapter)
Height	5/8 in.
Length	3 in.
Weight	4¾ oz.
Material	Sheet steel
Minimum safe load	1½ lb.
Color	Olive drab

Description: The body of the switch consists of a shallow channel section with open ends, and a hinged cover provided with an inclined tongue. Into one side of the body is clipped the fuse adapter, complete with percussion cap, by means of a metal leaf. A two-leaf steel spring is attached at one end to the same upright side as the fuse adapter. A striker is fixed to the other end of the spring. A brass block, with a hole bored in its center, is fixed to the bottom of the switch body. A safety-pin hole is drilled in the side of the switch body opposite that to which the striker spring and fuse adapter are attached. A safety pin passes through the switch body, striker head, and brass block.

Functioning: When pressure is removed from the hinged lid of the switch, the pressure of the spring on the inclined tongue forces the lid

upwards. The spring and the striker are then released, and the striker is driven into the percussion cap.

Use: This switch may be placed under crates, packages, books, or other suitable objects in booby-trap installations, where initiation by release of pressure is desired. Though rarely used as such, this switch may be employed to initiate demolition charges.

Installing: Bend the leaf spring back until the hole in the striker comes opposite the safety-pin hole in the switch body. Insert the safety pin through the switch body, striker, and brass block. Insert the fuse adapter in the hole in the side of the switch body. Close the lid. Place the switch under a concealing object so that the lid is held tightly closed. Connect the fuse adapter to the explosive charge with safety fuse. Withdraw the safety pin. If sufficient weight has been placed on the lid of the switch, the safety pin will come away easily. On no account should the pin be withdrawn from the switch when the charge is connected, if the pin is at all tight.

Disarming: If the device is accessible, insert a safety pin in the safety-pin hole, cut the safety fuse, and remove the device and the charge. If the device is inaccessible, cutting the safety fuse between the switch and the charge will have to suffice.

Remarks: Test this device for re-use by cocking the switch and slowly releasing pressure on the lid. After testing, recock. The striker may require readjustment following test firing.

Pull Switch No. 4 Mk I (Service)

Data

Diameter	7/16 in.
Length	3¾ in.
Weight	1¼ oz.
Material	Brass
Pull required	6-8 lb.
Color	Olive drab

Description: This device consists of a housing tube with two mounting eyes attached externally to assist in attaching the mechanism to

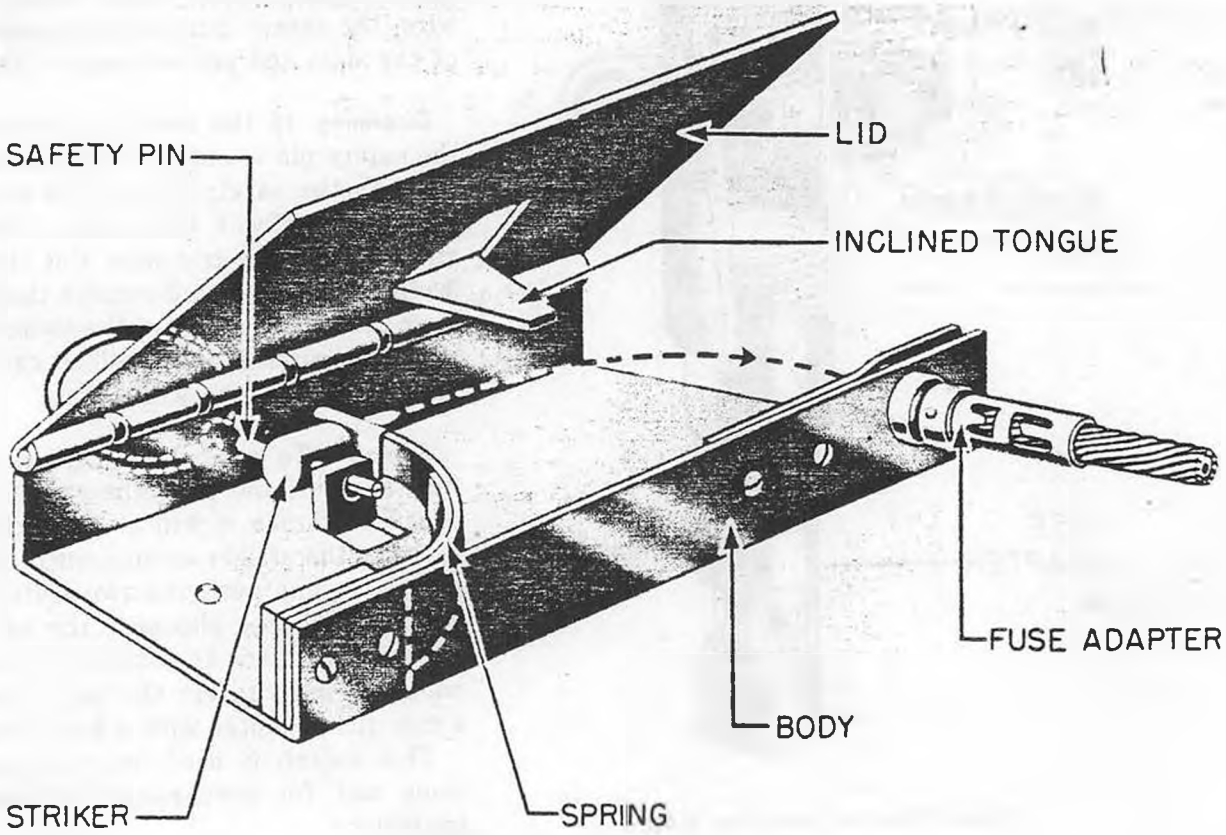


Figure 269—Release Switch No. 3 Mk I

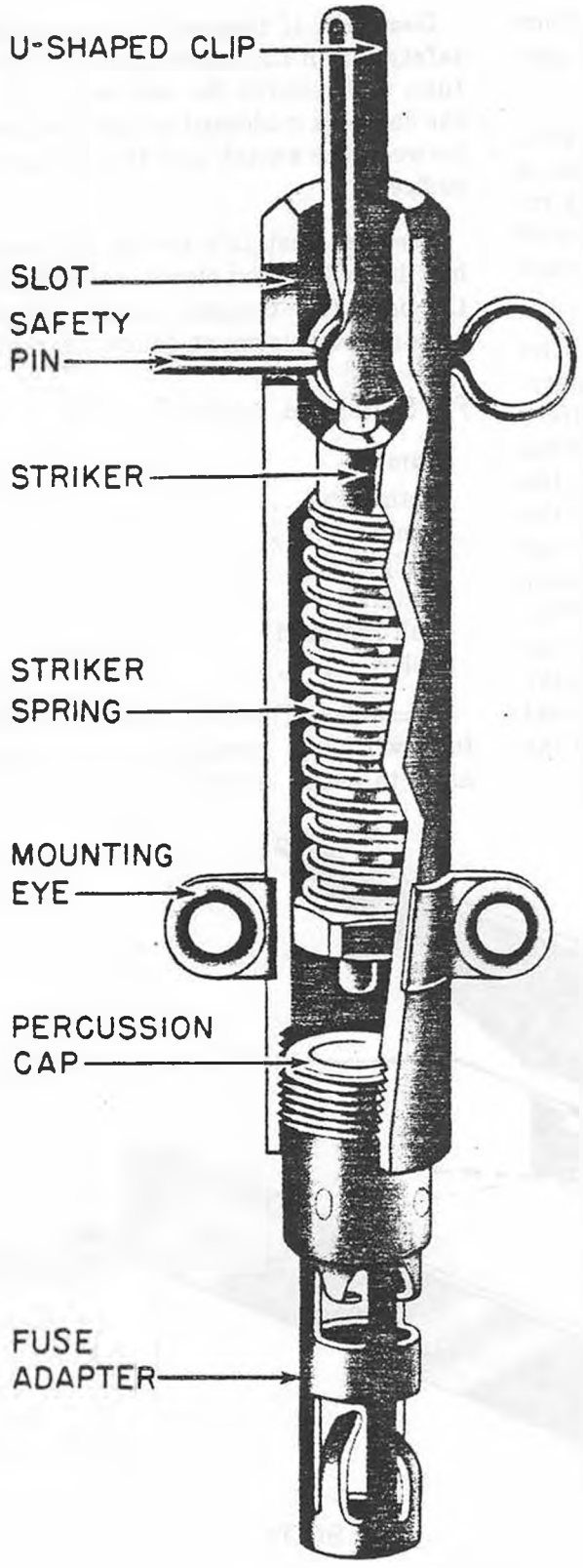


Figure 270—Pull Switch No. 4 Mk I

any convenient object. The housing tube has a fuse adapter screwed into one end, and contains a spring-loaded striker. A U-shaped clip, which grips the rounded end of the striker assembly, holds the striker in the cocked position. A safety pin passes through the housing tube and the rounded head of the striker.

Functioning: A pull on the trip wire attached to the U-shaped clip will withdraw the clip and release the striker, which will then be forced by its spring into the percussion cap.

Use: This device is intended primarily for use with a trip wire to fire booby-trap installations. It may also be used to fire mines, flares, and demolition charges.

Installing: To install this switch, unscrew the fuse adapter. Attach the switch to any desired object, and attach a trip wire to the U-shaped clip. Adjust the tension of the trip wire until the safety pin lies about half way along the slots in the body. Connect the charge to the fuse adapter with safety fuse, and screw the adapter into the end of the switch. Withdraw the safety pin. If there is too much tension on the trip wire, the safety pin will jam against the ends of the slots and prevent easy withdrawal.

Disarming: If the switch is accessible, insert the safety pin through the slot in the body and through the safety-pin hole in the ball end of the striker. Check both ends of the trip wire, and then cut the trip wire. Cut the safety fuse leading to charge, and remove the fuse adapter from the switch. Remove the switch and charge.

If the switch is inaccessible, cutting the connecting safety fuse will suffice.

Remarks: To reset this switch, unscrew the fuse adapter, and push the striker back with a pencil as far as it will go. Use the safety pin to twist the striker around until the safety-pin hole is in line with the two slots in the body. Fit the U-shaped clip over the ball end of the striker, and allow the striker to move forward about ¼ inch. Insert the safety pin. Screw in a new fuse adapter with a percussion cap.

This switch is used only for special operations and for preparatory training in these operations.

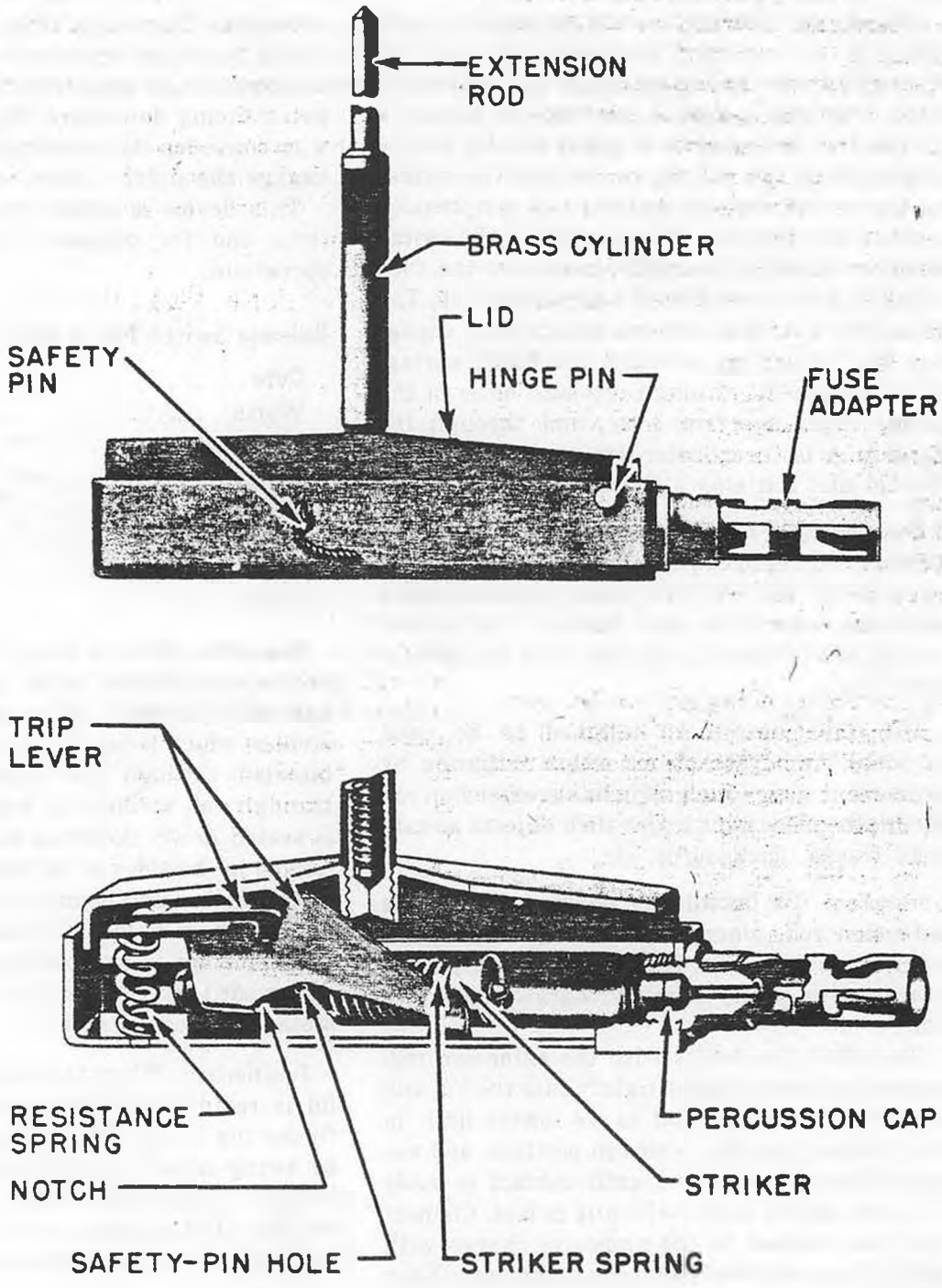


Figure 271—Pressure Switch No. 5 Mk I

Pressure Switch No. 5 Mk I (Service)

Data

Width .....1¼ in.
Height .....¾ in.
Length.....3¾ in. (with fuse adapter)
Weight .....4¾ oz.
Material .....Metal alloy
Pressure required...Above hinges, 50-60 lb.; at end away from hinges, 21 lb.
Color .....Olive drab

Description: This mechanism consists of a body enclosed in a case and covered by a hinged lid. Two small holes in the bottom of the case facilitate attachment. Inside the case is located a double trip lever, which engages a notch on the underside of the striker and retains the striker in the cocked position against the compression of the striker spring. The open end of the switch body is threaded internally to receive the fuse adapter, which contains the percussion cap. The trip lever is held in the raised position, engaging the striker, by a double resistance spring. A safety pin fits through opposite holes in the body, under the trip lever, and through the striker. A brass cylinder screws into a hole in the lid and contains a threaded extension rod.

Functioning: Pressure on the lid or on the extension rod depresses the trip lever against the pressure of the resistance spring and disengages the trip lever from the striker. The striker spring then forces the striker into the percussion cap.

Use: This switch is designed to be used in booby-trap installations where initiation by pressure is desired. An adjustable extension rod facilitates placement under such objects as railroad tracks, duckboards, etc.

Installing: To install the device without the extension rod, place the device in the desired position, and connect fuse adapter to explosive charge with safety fuse. Withdraw the safety pin.

To install the device with the extension rod, screw the brass cylinder tightly into the lid, and screw the extension rod to its lowest limit in the cylinder. Set the device in position, and unscrew the extension rod until contact is made with the object under which it is laid. Connect the fuse adapter to the explosive charge with safety fuse, and withdraw the safety pin. Easy withdrawal of the safety pin is prevented if excessive pressure is applied when setting up on the extension rod. If the safety pin cannot be withdrawn easily, release tension on the extension rod.

Disarming: Insert a safety pin in the safety-pin hole and cut the safety fuse connecting the switch with the charge. Remove the fuse adapter, and then remove the switch and charge.

Remarks: To recock this switch, unscrew the fuse adapter and withdraw the striker. Reinsert the striker and striker spring, with the striker notch facing downward. Push back the striker with a wooden rod until the lips of the trip lever engage the notch. Insert the safety pin.

This device is issued only for special operations and for preparatory training in these operations.

Release Switch No. 6 Mk I (Service)

Data

Width	9/16 in.
Height	¾ in.
Length	4½ in. (with adapter)
Weight	3½ oz.
Material	Metal alloy
Minimum safe load	6 lb.
Color	Olive drab

Description: This switch consists of a body, over which is fitted a lid that is hinged at one end. In the body is located a spring-loaded striker, which is held in position by a safety pin inserted through the sides of the body and through the striker. In addition, when the lid is seated firmly down on the body, a trip lever, hinged in the sides of the body, engages a notch in the striker and holds the striker back against its spring. A stop pin limits the movement of the trip lever in an upward direction. The body is threaded internally at the open end to receive a standard fuse adapter.

Functioning: When the restraining load on the lid is removed, the pressure of the trip lever forces the lid up. The trip lever is then allowed to swing in a counterclockwise direction and become disengaged from the notch in the striker. The striker spring then forces the striker into the percussion cap.

Use: This switch is designed for booby-trap installations where initiation by release of pressure is desired. Its design allows it to be inserted into narrow openings, as under a door, behind a drawer, etc. It is designed to withstand the weight of heavy objects, such as packing cases, etc.

Installing: Insert the necessary length of safety fuse in the fuse adapter. Install the

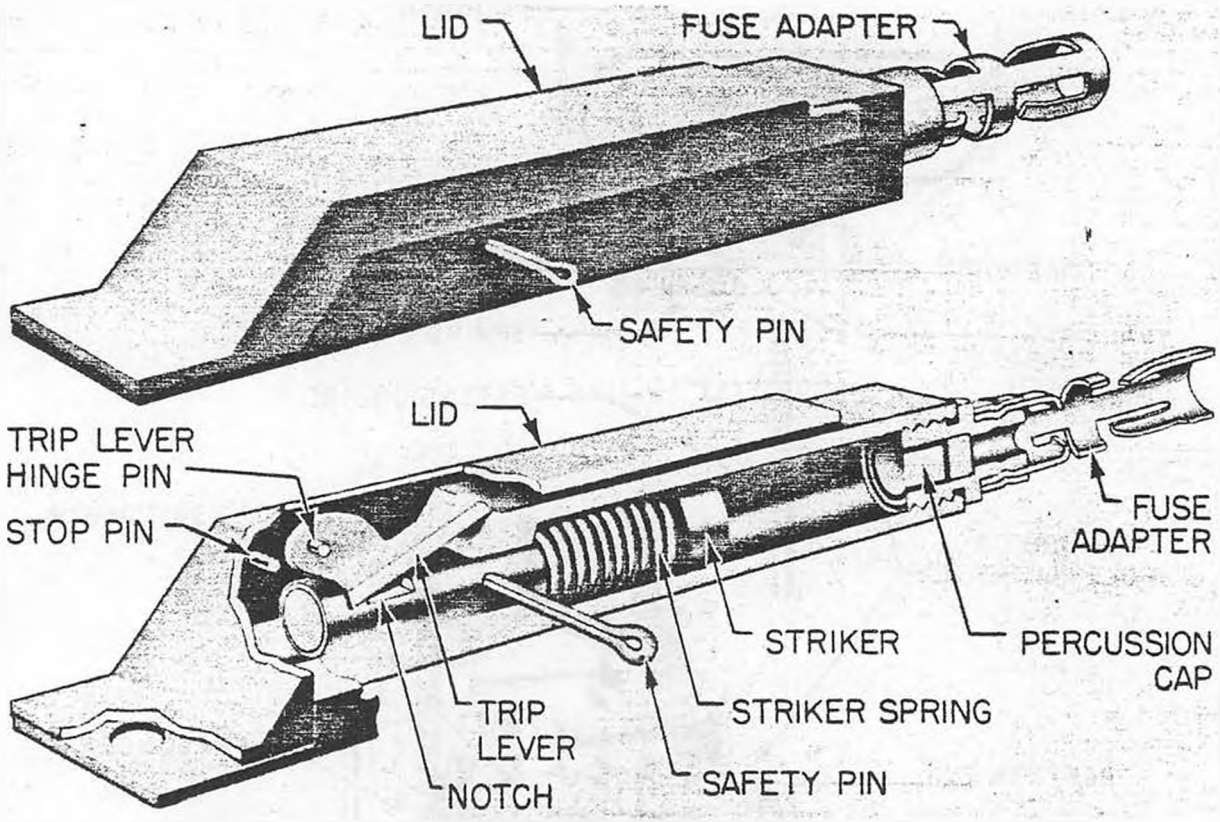


Figure 272—Release Switch No. 6 Mk I

switch in the desired position, and connect the other end of the safety fuse to the explosive charge. Withdraw the safety pin, which should come away easily, since the trip lever has forced back the striker and unlocked the safety pin. If the safety pin does not withdraw freely, the weight on the switch lid is insufficient and should be increased. Do not attempt to force out a safety pin which seems difficult to remove.

Disarming: If the device is accessible, insert a safety pin in the safety-pin hole, cut the safety fuse connecting the switch to the explosive charge, and remove the fuse adapter. If the switch is inaccessible, cutting the safety fuse will have to suffice.

Remarks: To reset this switch, unscrew the fuse adapter and withdraw the striker and spring. Throw the trip lever over until it rests on the stop pin. Insert the spring and the striker, with the notch on the striker uppermost. Force back the striker with a pencil or rod, and insert the safety pin. Throw the trip lever forward, and close the lid. Screw in a new fuse adapter with percussion cap.

This switch is used only for special operations and for preparatory training in these operations.

Press-Pull Switch No. 7 Mk I (Obsolete)

Data

Width	2.6 in.
Height	0.95 in.
Length	4.0 in.
Weight	8 oz.
Material	Tin
Pull or pressure required (Depending on setting)	5-35 lb.
Color	Olive drab

Description: The switch consists of a tin case with a bottom cap and spring to hold either a service Battery, Dry, W, Mk I or a standard 3-cell, flat torch battery. The case is fitted internally with an operating mechanism and externally on the top with two terminals for

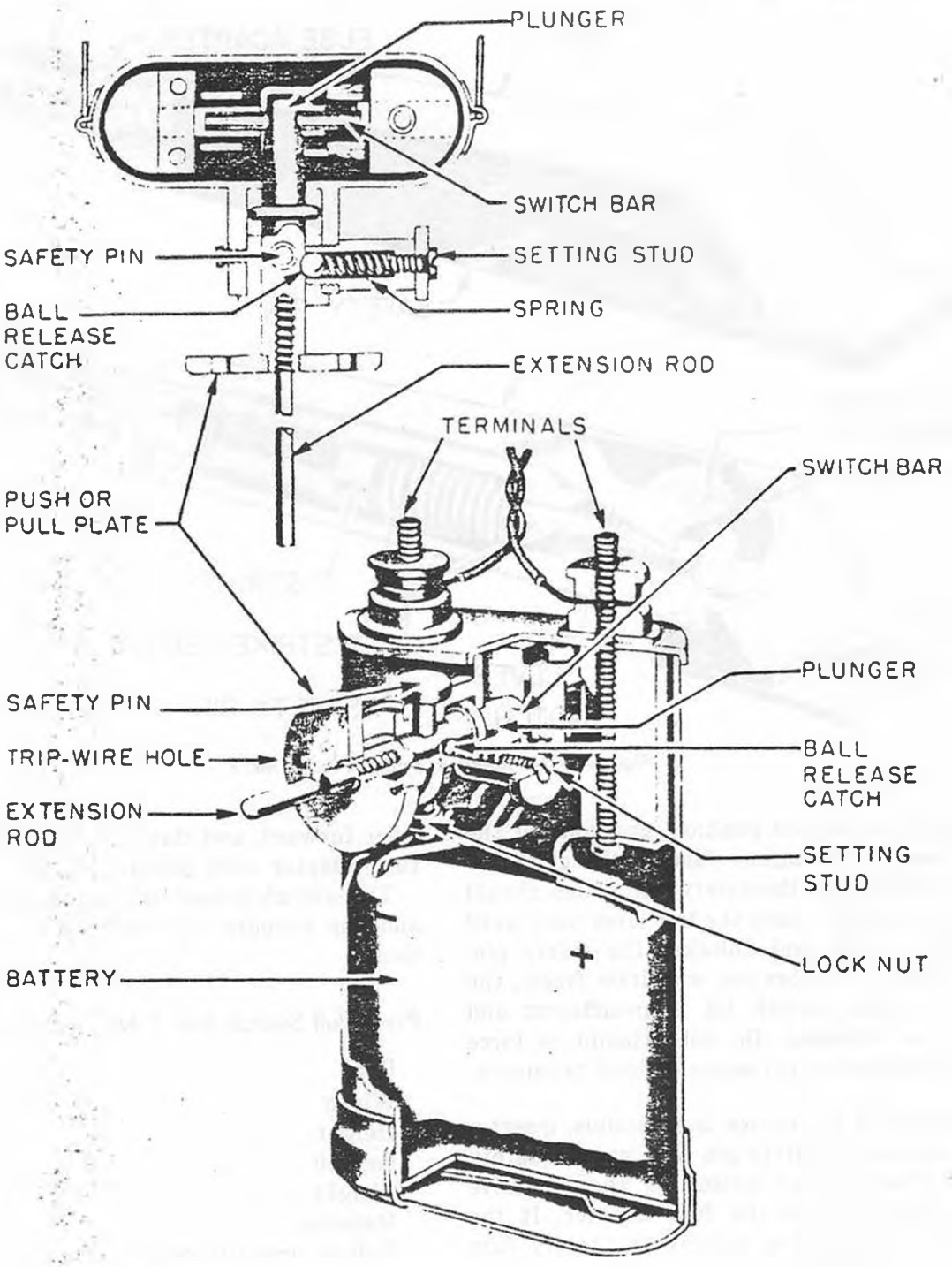


Figure 273—Press-Pull Switch No. 7 Mk I

connection to the electric firing cable. The push or pull mechanism on the side of the case consists of a plunger fitted externally with a push or pull plate, and internally with a switch bar which completes the circuit when the plunger is either pushed or pulled. Two holes are drilled in the push or pull plate for the attachment of a trip wire, and the plate is threaded centrally for the insertion of an extension spindle.

The actuating tension or pressure is determined by the tension of the spring in the ball release catch, which is located on the side of

the plunger housing. The tension of the spring is adjusted by the setting stud. The lightest actuating tension is about five lb. and can be increased to any desired amount up to 35 lb. by screwing in the setting stud.

A safety pin with locknut prevents the plunger from being pulled or depressed inadvertently. The safety pin cannot be withdrawn unless the plunger is in the dead neutral position and held so by the ball release catch.

Functioning: With the safety pin removed, necessary pull or pressure on the plate overcomes the pressure of the ball release catch, and the switch bar completes the circuit, thus firing the electric detonator to which the leads are attached.

Use: This switch is designed for booby-trap installations where initiation by either pull or pressure is desired.

Installing: Place the mechanism either for pressure or for trip-wire use, and adjust the actuating pressure as required. Connect the firing leads to the terminals on the top of the case and withdraw the safety pin.

Disarming: Remove the leads from the battery terminals. Replace the safety pin and remove the switch and charge.

Remarks: To test this switch for re-use, connect to an electric detonator of the type to be used. Withdraw the safety pin, and push or pull the plunger to fire the detonator.

In December 1943, the following instructions were issued by the Chief Engineer, Allied Force Headquarters:

"This switch (No. 7) is defective, and if in possession of units will be destroyed."

A./P. Switch No. 8 Mk I (Service)

Data

Diameter....Body, ½ in.; top plate, 1½ in.
Length .....5¾ in.
Total weight .....4 oz.
Material ..... Steel
Pressure required.....10 lb. (approx.)
Color....Black, olive drab, or unpainted steel
Explosive ..... .303 cartridge

Description: This switch consists of a hollow metal spike, flanged at the open end, which can be pressed into the ground or hammered with care into a road. Inside the spike is placed the firing assembly, consisting of a metal spindle,

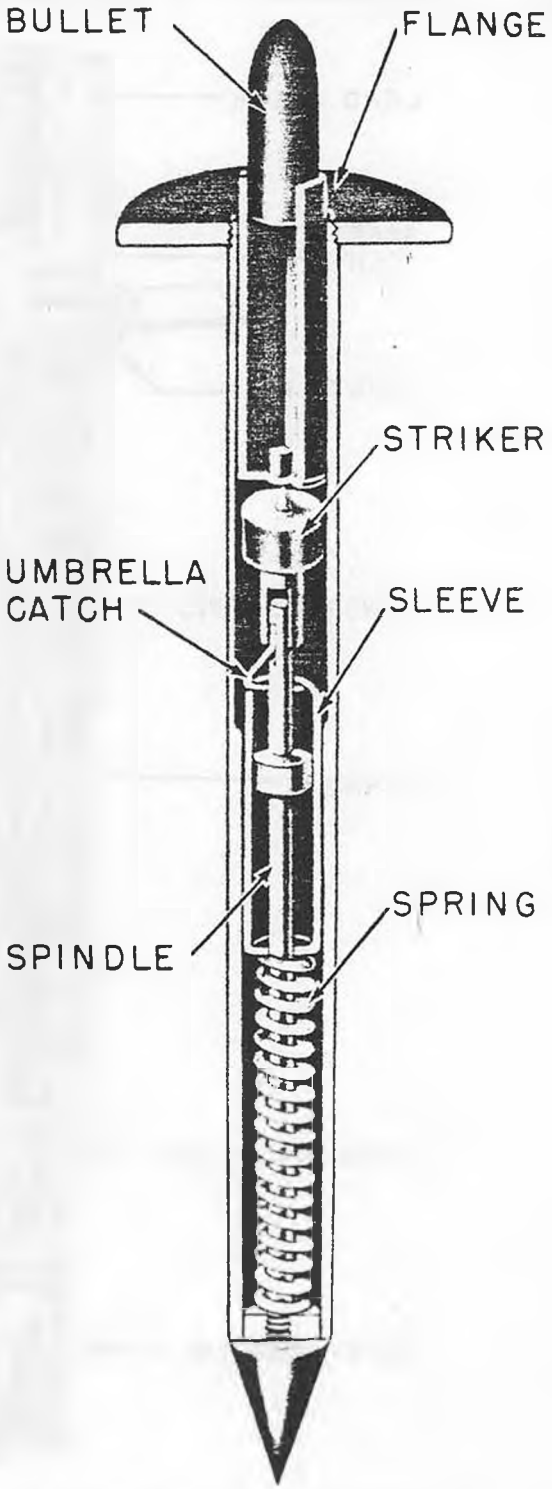


Figure 274—A./P. Switch No. 8 Mk I

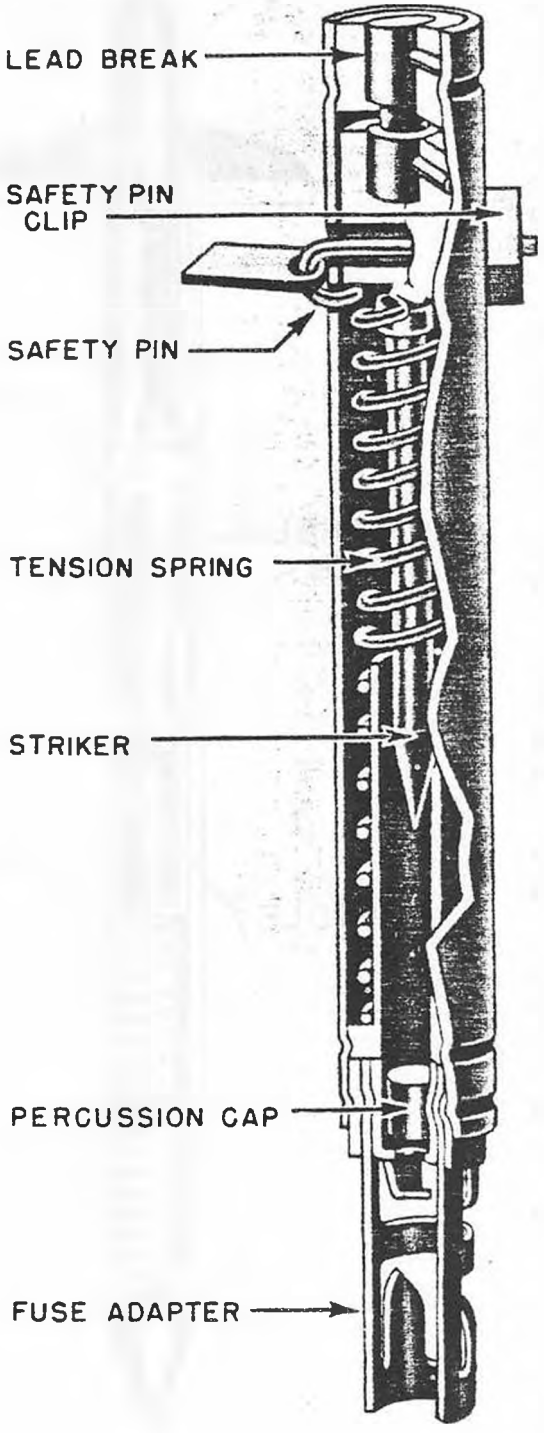


Figure 275—L. Delay Switch No. 9 Mk I

flanged at the base with an umbrella catch located near the top. A spring and spring-retaining sleeve fit over the spindle and are held compressed by the umbrella catch. Over the top of the spindle is placed a striker with a hollow shaft, and on top of this is placed a rimless .3 cartridge, with a bullet which just protrudes out of the spike.

Functioning: Slight pressure on top of the bullet forces the hollow shaft of the striker over the umbrella catch, releasing the sleeve which holds the spring in compression. The spring drives the sleeve upwards against the striker head, forcing the striker into the base of the cartridge and firing the cartridge.

Use: This self-contained unit, which discharges a bullet, is sunk into roads and pathways. Fired by pressure, the bullet will perforate a man's foot or severely damage a pneumatic tire.

Installing: This assembly usually is issued cocked and ready for use, being held in position in the spike by a cork. If it is necessary to cock the switch, first push the empty barrel into the ground to the level of the flange. Place the spring-retaining sleeve, rounded end down, over the spring, and push down until the catch engages over the top of the sleeve. Place the cocked mechanism in the barrel of the switch and lower the striker into the barrel. At arm's length, lower the cartridge gently into the barrel with the point upward. Hold the cartridge between the fingers when inserting to minimize the danger in case of premature firing.

Disarming: Carefully remove the cartridge from the pistol by grasping it between the fingers at arm's length.

Remarks: Test this switch by cocking the mechanism and inserting the striker. Depressing the striker with the blunt end of a pencil will compress the catch and release the spring-retaining sleeve. The impact can be felt in the pencil. Never use the cartridge for testing.

Never place the cartridge in the spike except when laid.

L. Delay Switch No. 9 Mk I (Service)

Data

Diameter	⅜ in.
Length	4⅜ in.
Weight	1 oz.
Material	Metal al
Color	Aluminum

Description: The operation of this time switch relies on the fact that tellurium lead stretches uniformly with time and will eventually break.

The switch consists of a tubular metal body, housing a striker, spring, and lead-break assembly. The lead-break consists of a short lead rod grooved in the center to form a neck of reduced diameter. The upper end of the rod is pegged into a brass collar, which is crimped into the top of the housing tube. The head of the striker also consists of a brass collar, into which the lower end of the rod is pegged. The striker collar is an easy sliding fit in the housing tube. The lower end of the tension spring is anchored to the base of the housing tube, while the upper end is hooked over a slot in the upper end of the striker. An adapter with a percussion cap is crimped into the base of the switch.

A safety pin, complete with retaining clip and label showing the delay time in days or hours, is provided to retain the striker against the tension spring.

Functioning: When the safety pin is removed, the pressure of the spring is taken by the lead-break. The lead-break stretches and eventually breaks, allowing the striker to be pulled down by the spring into the percussion cap.

Use: This device is designed to explode a demolition charge by delayed action.

Installing: Refer to the temperature-correction table included with each box of switches, and select the proper switch. Withdraw the safety pin, and connect the switch to the explosive charge. The safety pin is of the self-locking variety, and should come away easily. If the safety pin is locked in place or difficult to remove, the switch should be discarded. The device is in operation as soon as the safety pin is withdrawn.

The switch may be connected to the explosive charge, either with fuse, or with a detonator and Cordtex. A service detonator may be crimped directly over the fuse adapter of the switch. If instantaneous or safety fuse is used, however, an adapter sleeve must first be crimped over the fuse adapter of the switch and the fuse then crimped into the adapter sleeve.

Disarming: This switch is impossible to disarm. If necessary to defuze, cut the detonating cord or fuse connecting the switch to the explosive charge, or disconnect the switch from the charge.

Remarks: Two switches should be used for each important charge to guard against risk of failure.

These switches are issued with ten different delay times, determined during manufacture. The delay time at 65°F. is indicated on the tab attached to the safety pin. The timing of these delays varies considerably with changes in temperature-correction table is included with each box of switches. To select the proper switch, choose the nearest timing to the one decided upon for the proper temperature, and then find the underlined figure in that column. This figure gives the labelling of the delay which should be used. The degree of accuracy of the timing is stated at plus or minus 30 per ecnt. However, better performance is usually obtained, especially for timings greater than 24 hours.

Temperature		Hours		
35°F.	3	16	32	64
45°F.	2	11	23	46
55°F.	1½	8	17	33
65°F.	1	6	12	24
75°F.	¾	4	8	17
85°F.	½	3	6	12
95°F.	½	2	4½	8
105°F.	½	1½	3	6
Temperature		**Days**		
35°F.	8	19	38	75
45°F.	6	13	27	54
55°F.	4	10	19	39
65°F.	3	7	14	28
75°F.	2	5	10	20
85°F.	1½	4	7	14
95°F.	1	2½	5	10
105°F.	½	2	4	7

Time Pencil Switch No. 10 Mk I (Service)

Data

Diameter .....5/16 in.
Length .....5 in.
Weight .....1½ oz.
Material.....Aluminum and copper
Color .....Unpainted

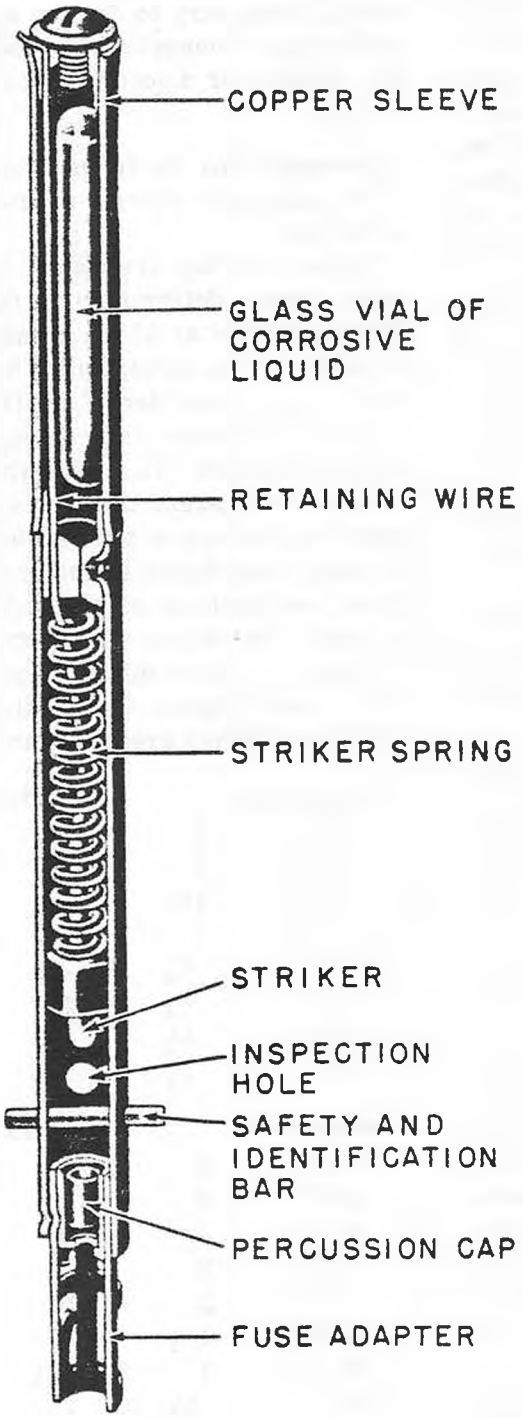


Figure 276—Time Pencil Switch No. 10 Mk I

Description: This switch consists essentially of a housing tube made up of two sections; a thin copper sleeve containing a glass vial of corrosive liquid, and a thin aluminum sleeve, housing a spring-loaded striker retained by a retaining wire. This retaining wire is attached to the upper end of the striker and fastened to the top of the copper sleeve. A fuse adapter and percussion cap are crimped into the base of the switch, and a safety bar pierces the housing tube between the striker and the percussion cap. Inspection holes are provided just above the holes for the safety bar.

Functioning: When the copper sleeve is crushed and the glass vial broken, the corrosive liquid is allowed to attack the retaining wire. When this wire is eaten through, the striker spring drives the striker into the percussion cap.

Use: This device is designed to explode a demolition charge by delayed action.

Installing: Refer to the table included with each box of switches, and select the proper delay. Look through, or pass a nail through, the inspection holes to see that the striker has not fallen and is not resting on the safety bar. Connect the explosive charge to the fuse adapter. A service detonator may be crimped directly over the adapter, or instantaneous or safety fuse may be used by crimping an adapter sleeve over the fuse adapter and crimping the fuse in sleeve. Crush the copper sleeve flat, without bending or fracturing the sleeve. Withdraw the safety strip. Do not leave the safety strip behind, as its color will indicate to the enemy the delay time of the switch. Always use two switches for each important charge, to guard against risk of failure.

Disarming: This switch cannot be disarmed safely. If it is essential to disarm it, insert the safety bar or a nail through the inspection holes, or cut the fuse connecting the switch to the explosive charge. After inserting the safety bar, remove the switch from the charge.

Remarks: If you can see through the inspection holes or insert a nail through them, the striker is cocked. If the sleeve has been crimped, discard the switch. If the sleeve is intact, unscrew the cap to see whether the glass vial is intact. If so, the switch may be re-used.

The times of delay are indicated by the colors of the safety bars. The following table, subject to a 25% variation either way, shows the change of the delay times with the change temperature:

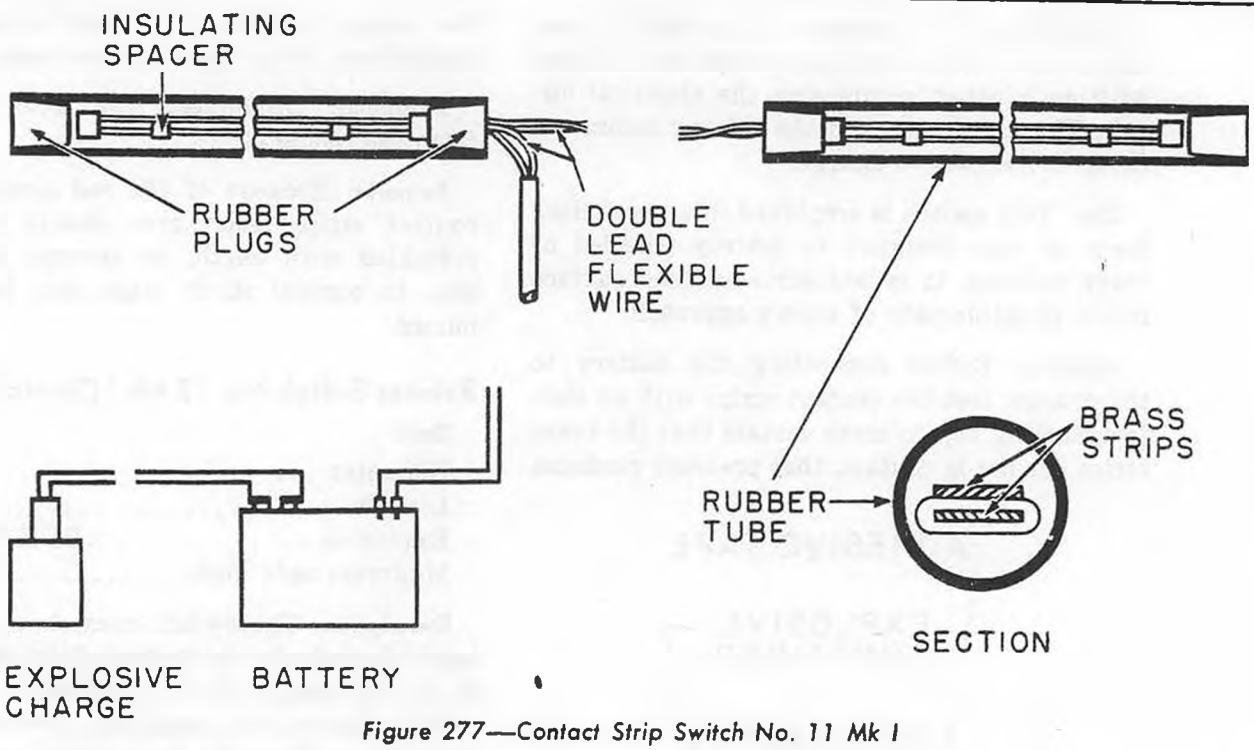


Figure 277—Contact Strip Switch No. 11 Mk I

Temperature	Red	White	Green
–4°F.	75 min.	19 hr.	3¼ days
14°F.	63 min.	13 hr.	2½ days
32°F.	43 min.	5 hr.	16 hr.
50°F.	31 min.	2¾ hr.	8 hr.
59°F.	27 min.	2 hr.	5¾ hr.
68°F.	23 min.	1½ hr.	4 hr.
77°F.	19 min.	1¼ hr.	3 hr.
99½°F.	12½ min.	¾ hr.	1½ hr.
109½°F.	9½ min.	34 min.	80 min.

Temperature	Yellow	Blue
–4°F.	10 days	—
14°F.	5 days	—
32°F.	28 hr.	—
50°F.	18 hr.	34 hr.
59°F.	12 hr.	24 hr.
68°F.	9 hr.	20 hr.
77°F.	6 hr.	15 hr.
99½°F.	3 hr.	6 hr.
109½°F.	2 hr.	5 hr.

Do not use the switch with the blue delay if the temperature is likely to be below freezing when the explosion is due to occur. A switch with a black safety bar, having a ten-minute delay, is issued for training purposes only.

In the original pattern (S.R.I.E.), which is now obsolete, the delay time was shown by means of colored stripes painted around the body of the switch.

This device is issued only for special operations and for preparatory training for these operations.

Contact Strip Switch No. 11 Mk I (Service)

Data

Diameter ..... ⅜ in.
Length ..... 6 ft.
Weight ..... 5 lbs. (with battery)
Material ..... Rubber tube
Color ..... Red

Description: The device consists of two arms, each 2 ft. 9 in. long, connected together by 6 in. of double-lead, flexible wire, and having another double lead of flexible wire provided with plugs to fit into the battery supplied with the switch. Each arm contains two brass strips held apart by insulating spacers every six inches. The strips are enclosed in red rubber tubing, the ends of which are closed with waterproof rubber plugs. Supplied with each set is a 9-volt dry-cell battery, fitted with two sockets to receive the contact-strip plugs, and with two screw terminals, to which are attached the leads to the detonator of the main charge.

Functioning: The passage of a vehicle over either arm forces the brass strips into contact with each other, completing the electrical circuit. The battery sets off the electric detonator, firing the explosive charge.

Use: This switch is employed in a specialized form of trap designed to destroy wheeled or track vehicles. It is laid across a road surface in the probable path of enemy approach.

Installing: Before connecting the battery to the charge, test the contact strips with an electric blasting cap to make certain that the brass strips are not in contact, that pressure produces the proper contact, and that contact is maintained after the pressure ceases.

Disarming: Disconnect the detonator leads from the battery.

Remarks: Because of the red covering of the contact strips, each arm should be painted, sprinkled with earth, or covered with grass, etc., to conceal it. It must not, however, be buried.

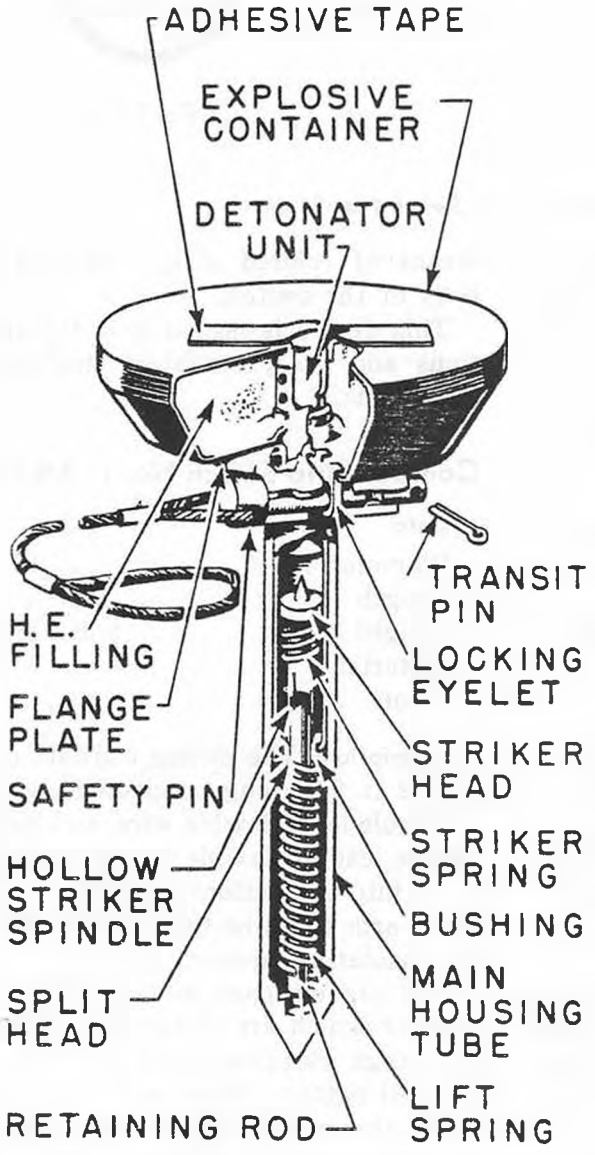


Figure 278—Release Switch No. 12 Mk I

Release Switch No. 12 Mk I (Service)

Data

Diameter .....3 in.
Length .....5¾ in.
Explosive .....RDX/TNT 50/50
Minimum safe load.....2 lb.

Description: The switch consists of a shallow, tapered explosive container, 3 in. in diameter by ¾ in. deep, from the center of which protrudes a short tube containing a striker release mechanism. This tube fits into the main housing tube, which terminates in a spike enabling it to be forced into the ground. A flange is fitted to the top end of the main housing tube and abuts against the base of the explosive container.

The tube of the striker release mechanism houses a striker head, attached to a hollow spindle which terminates in a small split head. The striker spring is placed between the striker head and a bush on the end of the short tube. This bush has a hole in its center just large enough to allow passage of the spindle's split head when collapsed. The split head protrudes through the bush and has a retaining rod inserted into the split end to hold it in position. When so located, the striker spring is compressed.

The retaining rod, which has a small washer on its bottom end, is located in the housing tube and surrounded by the lift spring. The striker release mechanism fits above it in the main housing tube. The lift spring tends to force the explosive container up and the release-mechanism tube out of the main housing tube unless prevented by a sufficient weight resting on top of the explosive container.

The detonator unit consists of a 4-gr. detonator spun into a tubular, windowed holder containing C.E. pellets. It is inserted through the

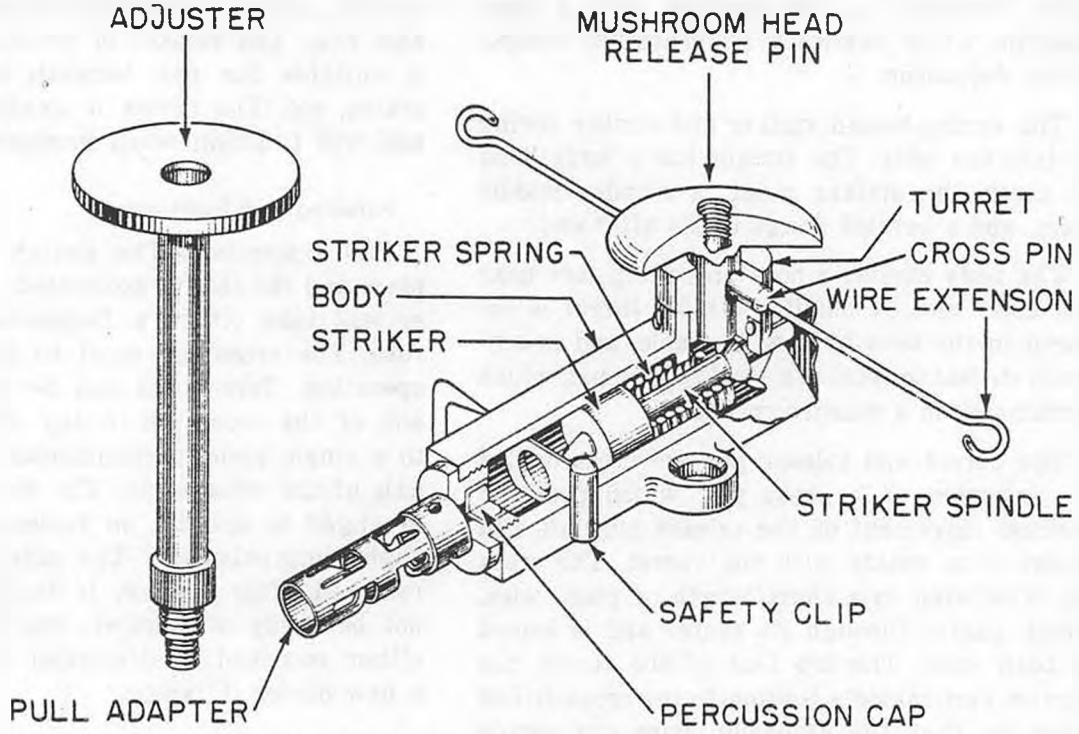


Figure 279—Pull-Pressure-Release Switch No. 13 Mk 1

center of the explosive container above the striker.

A self-trapping safety pin passes through a turned-over portion of the flange secured to the main housing tube, and also through an eyelet attached to the bottom of the explosive container. When in place, this safety pin prevents separation of the two parts and the resultant release of the striker. The safety pin has an annular groove in its stem which engages the eyelet of the explosive container if an attempt is made to remove the pin when the load on the explosive container is insufficient to overcome the pressure maintained by the lift spring. A split transit pin is inserted through the end of the safety pin to prevent its withdrawal before preparation for use.

Functioning: When the weight is removed from the explosive container, the lift spring forces the container and release-mechanism tube upward. This disengages the retaining pin from the split striker spindle, and allows the striker to be carried forward by the compressed striker spring. The striker fires the detonator unit, which explodes the main explosive charge.

Use: This switch is employed as an anti-lifting device. It is ideal to prevent removal of land mines.

Installing: Force the spike of the switch into the ground. Place a sufficient weight on the explosive container, and withdraw the safety pin.

Disarming: If the switch is accessible, insert a safety pin through the flange and eye. If it is not readily accessible, destroy it in place.

Pull-Pressure-Release Switch No. 13 (Service)

Data

Width ..... ½ in.
Height .....1 in. (without adjuster)
Length ..... 23/16 in. (without fuse adapter)
Total weight ..... 3 oz.
Material ..... Mazak
Color ..... Black
Operating load ..Pull, 3 lb.; pressure, 35-50 lb.; release, 2 lb.

Description The square body of this switch is made of die-cast Mazak, and has two perforated lugs at the center to facilitate placement.

The body is drilled longitudinally, and internally threaded at one end to take a fuse adapter, which carries a 1.7 grain "B" composition detonator.

The spring-loaded striker and striker spring fit into the body. The striker has a large head to carry the striker point, a slender middle stem, and a beveled flange on its after end.

The body carries a boss on its top face near the after end. A small rotatable turret is secured in the boss by a wire staple, and is centrally drilled to receive a steel release pin, which terminates in a mushroom head.

The turret and release pin are cross drilled for insertion of a cross pin, which prevents vertical movement of the release pin, but still allows it to rotate with the turret. The cross pin is secured to a short length of piano wire, which passes through its center and is looped at both ends. The top face of the turret has narrow vertical slots leading to the cross-drilled holes, so that the extension wire can escape vertically when the cross pin has been withdrawn sufficiently. These slots are not wide enough to allow the escape of the cross pin itself. When the release pin is in place and the cross pin has been inserted, the lower end of the release pin engages the beveled flange on the after end of the striker to hold the cocked striker in position.

A slot through the body enables a flat safety clip to be inserted between the striker and the detonator. A central hole in the clip engages the striker point, if the striker is released while the clip is in place, and prevents withdrawal of the safety clip, as well as any further forward motion of the striker.

The mushroom head of the release pin is centrally threaded to take an adjuster. This adjuster is a rod having a flat head at one end and two sets of threads at the opposite end. The first set of threads screws into the release pin, while the second set carries a knurled locking nut which enables the height of the flat head to be adjusted between 3¼ in. and 4¾ in. above the base of the switch.

This device may be used in booby-trap installations where pull-pressure, or release-of-pressure operation is desired. It may also be used to initiate demolition charges. Its adjustable head and release or pressure firing make it suitable for use beneath railroad tracks, crates, etc. The device is unaffected by water and will function when immersed.

Installing and Functioning

Pull Operation—The switch is fastened in place and the charge connected. The fuse adapter will take either a Detonator No. 27 or a fuse. The cross pin must be in place for pull operation. Trip wires can be run from either end of the cross pin in any direction, limited to a single plane perpendicular to the vertical axis of the release pin. The device can also be arranged to operate on release of tension by slight improvisation. The safety clip must be removed after setting. If the safety clip can not be easily withdrawn, the device must be either recocked or discarded and replaced by a new device if faulty.

A pull on the trip wire of approximately three pounds will retract the cross pin sufficiently so that the extension wire is free to move up the vertical slots in the turret head, thus leaving the release pin free to move upward. The beveled flange on the striker, which is forced against the bottom of the release pin by the compressed striker spring, cams the release pin upward, thus freeing the striker. The striker fires the detonator.

Pressure Operation—The switch is secured in place, the charge connected, and the safety clip removed. The cross pin must be in place for pressure operation. The adjuster may be used in placing the switch.

When the mushroom head of the release pin or the adjuster plate is subjected to a load of 35 to 50 lb., the striker stem is fractured by the bottom end of the release pin, freeing the spring-loaded striker, which is forced forward to fire the detonator.

Release Operation—The switch is secured in position, the charge connected, the cross pin removed, and the safety pin removed. The adjuster may be used in placing the switch. A load of two pounds on the adjuster plate

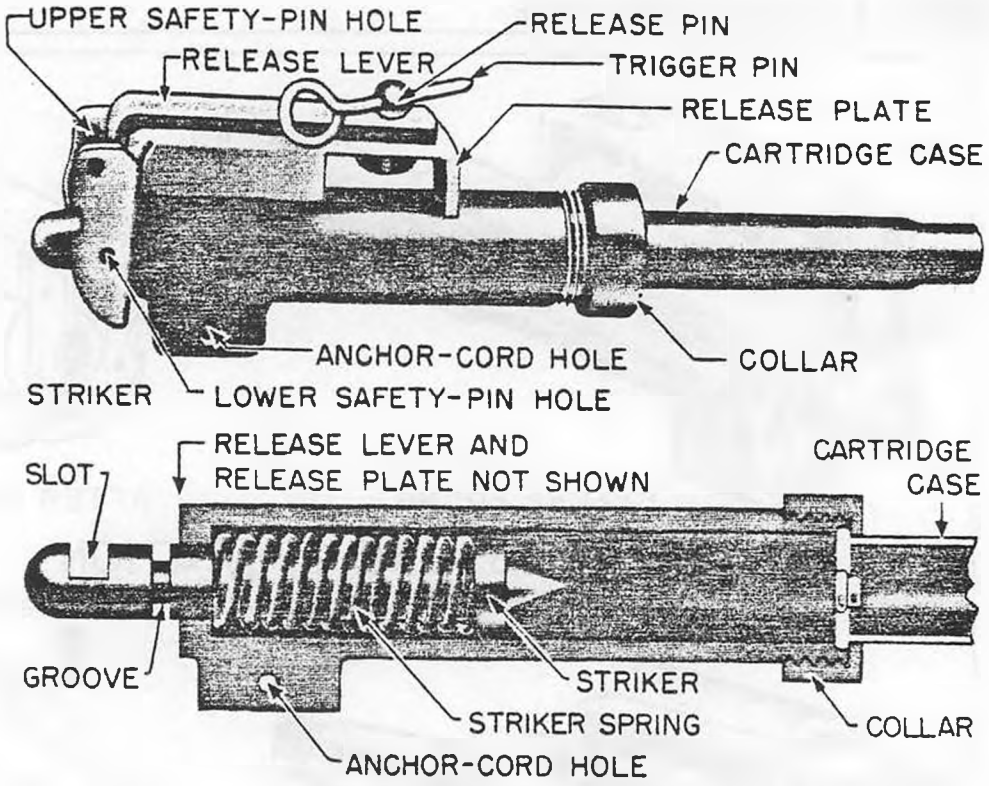


Figure 280—Murray Combination Switch Mk I

release-pin head will maintain the switch in the cocked position.

When the restraining weight is removed, the beveled flange on the striker, which is forced against the bottom of the release pin by the compressed striker spring, cams the release pin upward, thus freeing the striker. The striker fires the detonator.

A switch set for release operation may also be fired by pressure if sufficient weight is applied.

Disarming: If the fuse is set for pull operation, check both ends of the trip wire, cut the trip wire, and insert a safety clip in the switch. Disconnect the charge, and remove the fuse adapter. When checking the trip wire, ascertain that the switch has not been arranged to operate by release of tension.

If the fuse is set for pressure operation, insert the safety clip, and remove the switch after making sure that the cross pin is properly in place. Disconnect the charge and remove the detonator.

If the switch is set for release operation, insert a safety clip in place, insert a wire or nail large enough to fill the hole into the cross pin holes, and remove the switch. Disconnect the charge and remove the detonator.

If the switch is not readily accessible, it may be necessary to cut the fuse leading to the charge, or to destroy the switch in place.

Murray Combination Switch (Australian) Mk I (Service)

Data

Width	5/8 in.
Height	1½ in.
Length	3½ in.
Weight	3¾ oz. (without cartridge)
Material	Die-cast brass and sheet metal
Operating load	Pull, 10 lb.; pressure, 11 lb. 2 oz.; release, 1 lb. 4 oz.
Color	Unpainted metal

Description: This switch consists of a striker assembly and a setting assembly. The striker

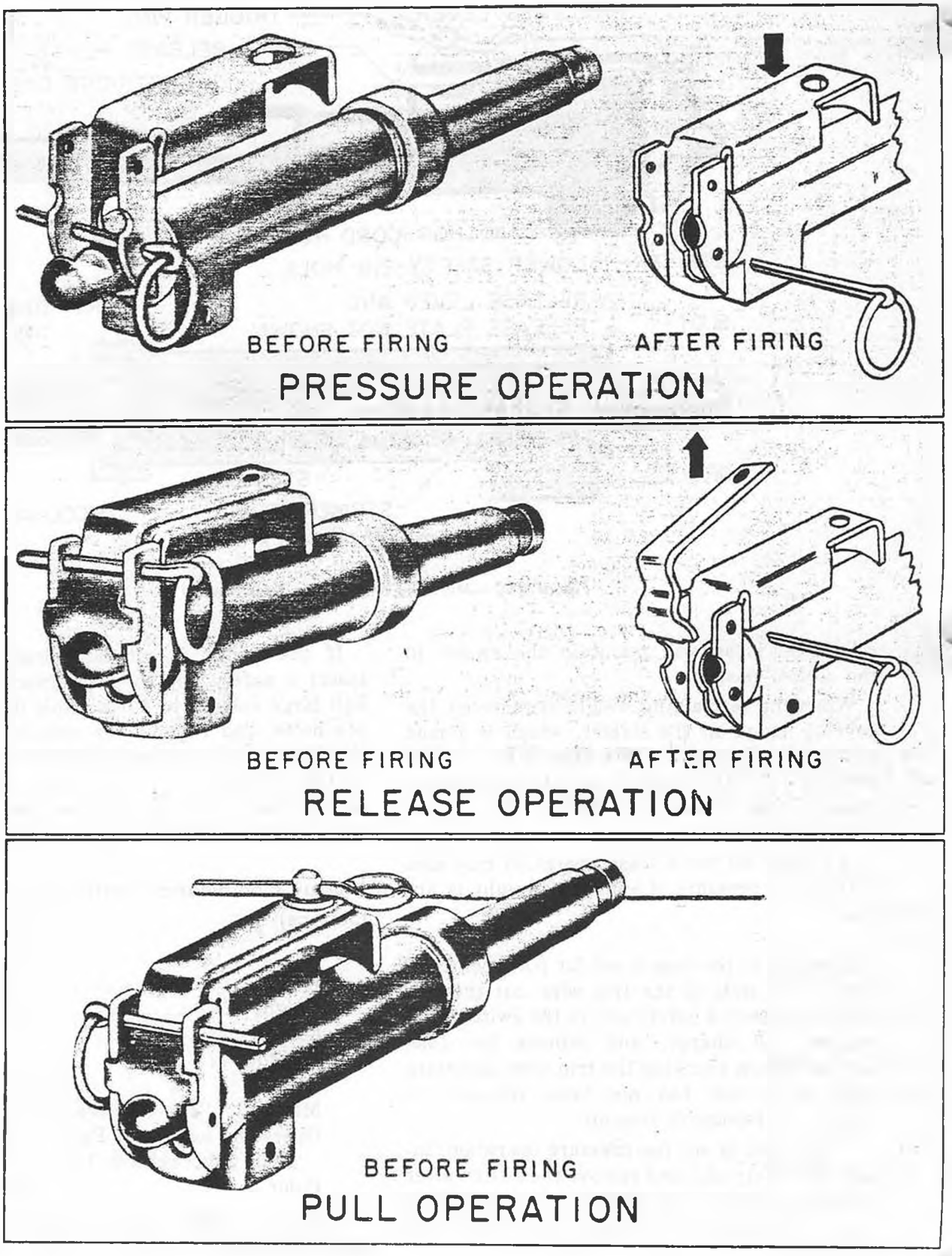


Figure 281—Murray Combination Switch Mk I

assembly is a tubular body containing a spring-loaded striker. One end of the body is threaded to receive a collar, which fastens the cartridge to it, while the other end is pierced by a hole through which the striker head protrudes. A projection on the body is pierced to take an anchor cord, used to facilitate installation. The striker head contains both a slot and an annular groove.

A release plate, release lever, trigger pin, release pin, and safety pin comprise the setting assembly. One face of the release plate has a keyhole slot which can engage the annular groove on the striker head. A circular hole in another face takes the release pin. An upper and lower hole are provided in two side flanges to take a safety pin. One end of the release lever engages the slot in the striker head, when it is used. A hole in its opposite end is provided for insertion of the release pin, which is simply a stud having a hole in its narrow end. The trigger pin, which is a metal pin with an eye in one end, can be inserted through the hole in the release pin.

The various components of the setting which are used, determine the type of action obtained from the switch.

Use: This device is designed for use in anti-personnel mines and booby traps. It may be used as a pressure, pull, or release-of-pressure switch.

Installing and Functioning

Pressure Operation—To install this switch for pressure operation, remove the release pin, trigger pin, and release lever. Unscrew the collar, and remove the cartridge. With the blunt end of a pencil push back the striker until the narrow part of the keyhole slot in the release plate can engage in the groove in the striker. Insert the safety pin in the lower safety-pin hole. Replace the collar and the cartridge case, and fit a detonator or fuse into the end of the cartridge case. Attach the switch to the charge or mine, and withdraw the safety pin.

Pressure on the release plate forces the plate toward the switch body, moving the keyhole slot downward, thus releasing the striker and firing the percussion cap of the cartridge.

Release-of-Pressure Operation — To install this switch for release operation, first set up the device as for pressure operation; column 1. Place the release lever in position over the release plate, and transfer the safety pin from the lower to the upper safety-pin hole. Push the release lever and plate together toward the switch body until the tongue on the release lever engages in the slot in the end of the striker. Install the device, with a weight restraining the lever, connect the charge, and remove the safety pin.

When the restraining load is removed from the switch, the release lever is disengaged from the slot in the striker. The freed striker, driven by its spring, then fires the percussion cap of the cartridge.

Pull Operation—To install this switch for pull operation, first set up the device as for release operation (above). Insert the release pin through holes in the release lever and plate, and insert the trigger pin. Attach a trip wire to a stake, tree, etc., and then to the trigger pin. Connect the switch to the charge or mine, and withdraw the safety pin.

A pull on the top wire withdraws the trigger pin and allows the release lever to be disengaged from the slot in the striker. The freed striker, driven by its spring, then fires the percussion cap of the cartridge.

Disarming: Insert the safety pin in the lower safety-pin hole when the device is set for pressure operation, and in the upper safety-pin hole, when set for release or pull operation. Disconnect the switch and the detonator from the charge or the mine, and then detach the detonator from the switch.

Remarks: Prior to re-use of this switch, examine the cartridge case to see whether an unfired cap is in place.

Percussion Igniter Switch Mk III (Obsolescent)

Data

Diameter	¾ in.
Length	3 in. (with adapter)
Material	Brass
Pull required	2¼ lb.
Color	Unpainted brass

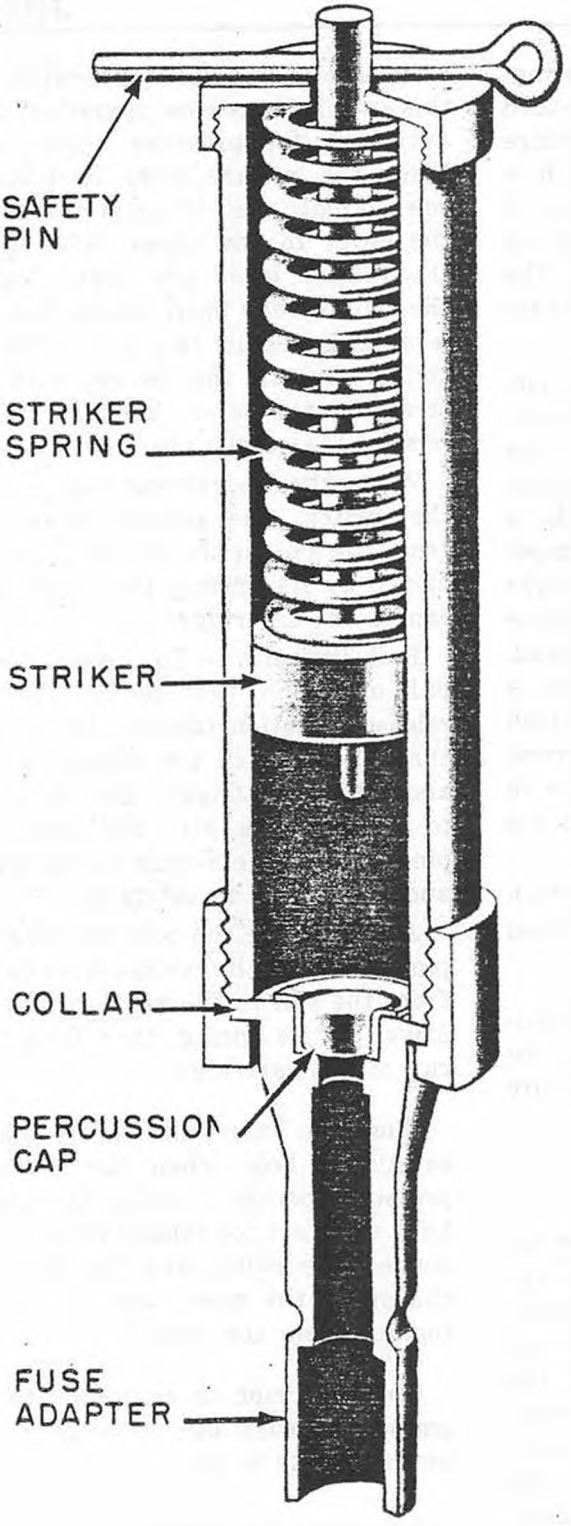


Figure 282—Percussion Igniter Switch Mk III

Description: The igniter consists of a cylindrical housing tube containing a spring-loaded striker. One end of the striker protrudes through a hole in the cap on the top of t housing tube, and is held cocked by a safety pin. The lower end of the housing tube is externally threaded to receive a collar, which holds the fuse adapter in place.

Functioning: A pull on the trip wire will remove the safety pin from the striker. The released striker will then be forced by its spring against the percussion cap in the fuse adapter, firing the fuse or detonator inserted in the adapter.

Use: This device may be used as a manually operated fuse lighter for non-electric firing of demolition charges. Operated by a trip wire, it may also be used to initiate improvised booby traps and mines. The device will ignite safety fuse directly, or fire detonators.

Installing: Fix the device in position, and connect the device to the explosive charge. Lead a trip wire from its anchor and attach it to the safety pin.

Disarming: Examine each end of the trip wire, and then cut the trip wire. Make certain th the safety pin is securely in place, and then cut or detach the length of fuse or detonating cord leading to the charge or mine.

Remarks: This device may be re-used by recocking and replacing the percussion cap.

Trip Mechanisms No. 4, No. 5, and No. 6 (Obsolete)

Data

Diameter ....No. 4, 0.65 in.; No. 5, 1.5 in.; No. 6, 0.75 in.
Length .... No. 4, 6.2 in. (with primer); No. 5, 5 in., (with primer); No. 6, 4 in. (with primer)
Operating load ..... No. 5, 4 or 12 lb.
Color ..... Unpainted steel

General: These devices, Trip Mechanisms Nos. 4, 5, and 6, are all obsolete and are included in this publication for information only. It is not expected that they will be encountered in operational use. Special note should be taken not to confuse these Trip Mechanisms with the British Switches Nos. 4, 5, and 6, which a in service use.

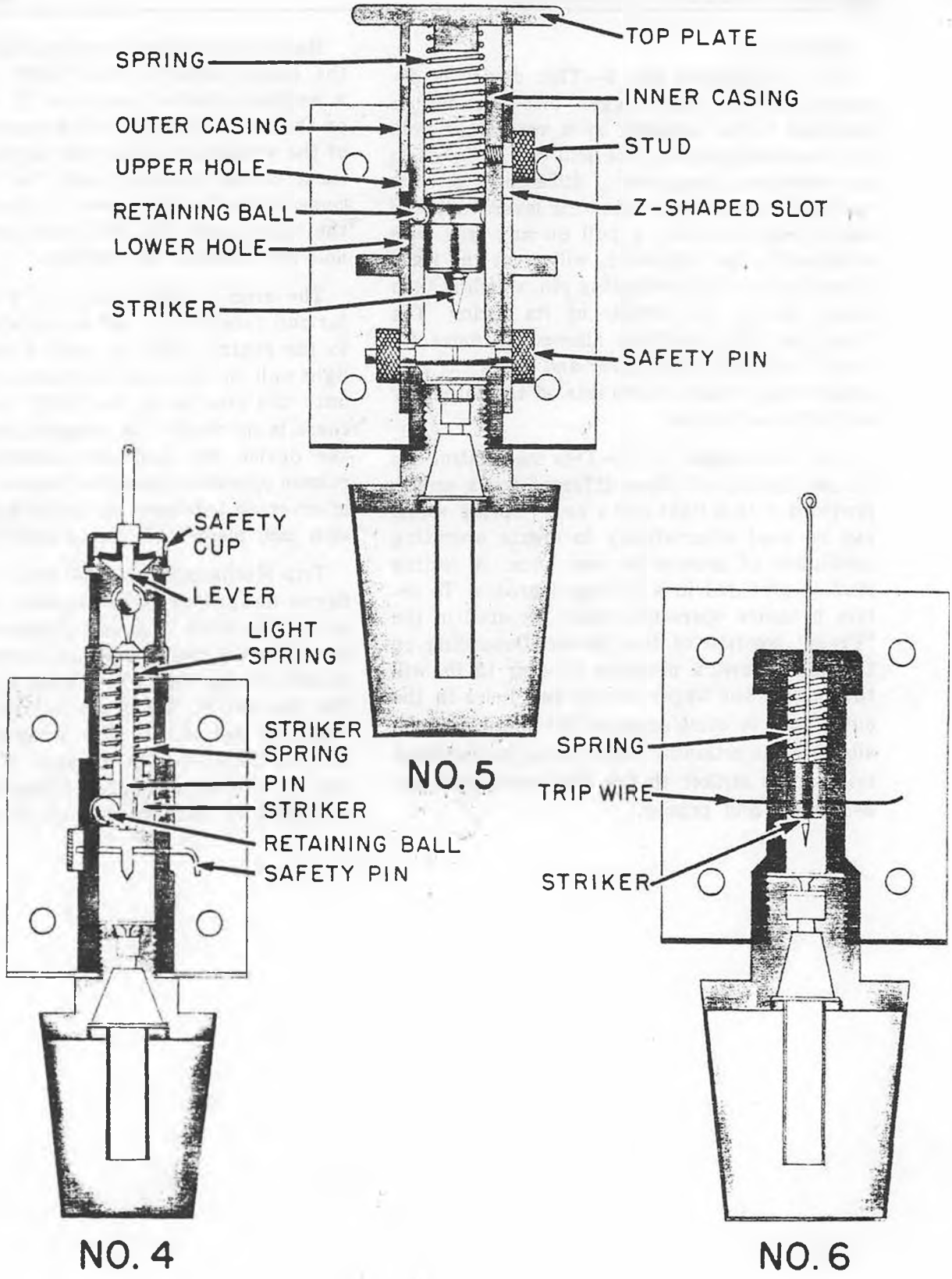


Figure 283—Trip Mechanisms No. 4, No. 5, and No. 6

Description

Trip Mechanism No. 4—This device is designed on the hair-trigger principle and is intended to be actuated by a very light pull. It is so arranged that the pull can be taken in any direction. A number of different trip wires can be attached to the actuating lever. With the safety clip removed, a pull on any trip wire attached to the trip lever, will pivot the lever from the top of the retaining pin, which is then forced out of the striker by its spring. The retaining balls are then allowed to move inwards, releasing the striker and firing the percussion cap, which in turn sets off the detonator and attached primer.

Trip Mechanism No. 5—This mechanism can be used in any of three different ways, and is provided with a light and a heavy spring which can be used alternatively to create operating conditions of greater or less force. A setting stud is provided in a Z-shaped groove. To obtain pressure operation, place the stud in the "Press" position of the groove. Depending on the spring use, a pressure of 4 or 12 lb. will then cause the upper of the two holes in the outer case to come opposite the retaining ball, allowing the retaining ball to move outward and release the striker to fire the percussion cap, detonator, and primer.

Release operation is accomplished by placing the setting stud in the "Lift" position with a weight of more than 4 or 12 lb., depending on the spring, placed on the top plate. Removal of the weight will allow the spring to force the inner casing upwards until the retaining ball comes opposite the lower of the two holes in the outer case. The ball then moves into this hole and releases the striker.

The stud is placed in the "Press" position for pull functioning, and a trip wire is attached to the central plate in such a manner that a light pull on the wire will rotate the outer case until the stud is in the "Lift" position. Since there is no weight to restrain the mechanism, the device will function immediately as for release operation, described above. A safety pin, intervening between the striker and the percussion cap, pierces the inner and outer casings.

Trip Mechanism No. 6—This is a very simple device designated to be operated by direct pull only. It consists of a spring-loaded striker, retained by the end of a special composition wire. A pull on the wire will release the striker and fire the device. Each mechanism is provided with two feet of this wire, wrapped around the body of the device when issued. If a longer trip wire is desired, a length of standard trip wire is spliced to the free end of the special wire.

ARMY DEMOLITION STORES

Detonators (blasting Caps)

The following are the standard British military detonators.

No. 8 Mk VII

Type ..... Non-electric
Dimensions ..... 1¼ in. x ¼ in.
Container ..... Copper tube
Explosive ..... Mercury fulminate
Explosive weight ..... 2 grams
Remarks ..... Colored red

No. 27 Mk I

Type ..... Non-electric
Dimensions ..... 1¾ in. x ¼ in.
Container ..... Aluminum tube
Explosive .....A.S.A. and Tetryl
Explosive weight ..... 9 grams
Remarks ..... Replacing No. 8

No. 33 Mk I

Type ..... Electric
Dimensions ..... 1¾ in. x ¼ in.
Container ..... Aluminum tube
Explosive .....A.S.A. and Tetryl
Explosive weight ..... 9 grams

Primers

Most British explosives are not initiated directly by a blasting cap or detonator, but rather by a special "Primer," or booster charge, placed between the detonator and the main charge. The following military primers are in use.

Dry Guncotton Mks I and II

Weight .....1 oz.
Dimensions.....1¼ in. x 1.35 in. to 1.15 in.
Remarks...Surface gelatinized with acetone

C.E. (Tetryl)

Weight .....1 oz.
Dimensions.....1¼ in. x 1.35 in. to 1.15 in.
Remarks.....Wrapped in waxed paper

One-Centimeter

Dimensions.....1¼ in. x 1 cm.
Remarks....Copper tube filled with a mixture of TNT and Tetryl, and P.E.T.N.

Explosive Charges

Refer to the chart on Army Explosive Charges, page 444.

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ARMY EXPLOSIVE CHARGES

Explosive	Type	Weight	Length	Diameter	Width	Height	Explosive	Explosive Weight	Wrapper
Gelignite	Cartridge	1.6 oz	3⅜ in.	⅞ in.	—	—	60% Gelatine	1.6 oz.	Waxed paper
Gelignite	Cartridge	¼ lb.	4 in.	1¼ in.	—	—	60% Gelatine	4 oz.	Waxed paper
"808"	Cartridge	¼ lb.	3½ in.	1⅜ in.	—	—	Desensitized Polar Blasting Gelatine	4 oz.	Thin paper (blue markings)
"808" Plastic	Cartridge	¼ lb.	3½ in.	1⅜ in.	—	—	Desensitized Polar Blasting Gelatine (Plasticized)	4 oz.	Thin paper (red markings)
Plastic H.E.	Cartridge	¼ lb.	4 in.	1¼ in.	—	—	Plastic Explosive	4 oz.	Cellophane
Ammonal	Cartridge	¼ lb.	5 in.	1⅜ in.	—	—	Amatol/TNT 80/20, with powdered aluminum	4 oz.	Rubberized fabric
Plastic H.E.	Cartridge	½ lb.	8 in.	1¼ in.	—	—	Plastic Explosive	8 oz.	Waxed paper
Wet Guncotton	Slab	1 lb.	6 in.	—	2¼ in.	1¾ in.	Wet Guncotton	1 lb.	None
C.E./TNT Mks I and II	Slab	1 lb.	4½ in.	—	2¼ in.	1¾ in.	C.E./TNT 25/75	1 lb.	Cardboard
TNT Mk I	Slab	1⅓ lb.	6 in.	—	3 in.	1½ in.	TNT	1⅓ lb.	
Ammonal	Block	25 lb.	9¼ in.	—	9 in.	9 in.	Amatol/TNT 80/20, with powdered aluminum	25 lb.	Metal can
Ammonal	Block	50 lb.	12¼ in.	—	11⅞ in.	10¼ in.	Amatol/TNT 80/20, with powdered aluminum	50 lb.	Metal can

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Security Information

Bangalore Torpedoes

2-in. Bangalore Torpedo Mks I and II: This torpedo, 62.5 in. long and weighing about 25 lb., consists of a steel body fitted with an ogival hardwood head. It contains a charge of about 7 lb. of Ammonal with a Primer Mk II C.E. fitted at the front end. Two studs are provided near the rear end of the body for assembly of the sections in series. The body is painted service green or brown, with a red band, below which are located identification stencillings. Two ¼-inch buff bands enclose a 1-inch green band on which the letter "A" is stencilled to denote the Ammonal filling.

20-ft. Lightweight E.P. Bangalore Torpedo: This torpedo is issued empty in sections 3 ft. long and 3 in. in diameter. It is made of light sheet steel. Each section is split longitudinally down the center to form a top and bottom half-section. A wooden nose plug, a wooden tail plug, six junction bands, and nine junction rings are issued with each outfit of seven complete sections of the torpedo. The torpedo was originally designed to be used in conjunction with the 20-ft. Flexible Torpedo, described below, as its filler, but it may be filled with cartridge-type explosive without any canvas lining.

20-ft. Flexible E.P. Bangalore Torpedo: This torpedo consists of a 20-ft. length of 2-in. diameter canvas hose, filled with "808", Gelignite, or Ammonal. A double length of Cordtex, passing through regularly spaced primers, runs through the explosive-filled hose. The torpedo was designed as an assault-demolition weapon to be used in single lengths, coiled or bundled, or stretched out and tied to other lengths. When rigidity is desired, this torpedo may be placed inside the 20-ft. Lightweight Torpedo, described above.

1½-in. Lightweight Bangalore Torpedo Mk I: This torpedo consists of a thin steel tube, 1⅝ in. in diameter. It is issued in two lengths, 6 ft. and 10 ft. The torpedo is painted brown, with a red band, below which identification stencillings are painted. Two ¼-in. buff bands enclose a 1-in. green band on which the letter "A" is stencilled to indicate the Ammonal filler. An ogival wooden head, fastened to a short metal sleeve with screws, is provided with each set of four sections. A studded metal band is provided with each section for use in joining the sections together.

Cavity Charges

Stock Charges: The 5-oz. Stock Demolition Charge Mk I and 7-oz. Stock Demolition Charge Mk II are exactly the same, except that the latter is 2 in. longer than the former. The 5 oz. Charge Mk I is a small, linear cavity charge, consisting of a tin outer casing 6 in. x 1-5/16 in. x 2 in., with an 80° angled copper arch fitted so that the apex is 1⅜ in. above the base. The charge is designed to cut 1 in. of steel. Two Cordtex leads are led through a groove in the top of the charge, above a series of primer pellets, and are held in place by four straps soldered to the outer casing. About 4½ in. of the Cordtex project from either end of the charge as leads. A 10-in. tinned copper wire is soldered to each corner of the charge to provide a method of fixing the charge, or of connecting two or more charges together.

Beehive Charges

6-in. Beehive Demolition Charge No. 1 Mk III—The 6-in. Beehive No. 1 Mk III is a ten-pound cavity charge containing 6¾ lbs. of Pentolite. The charge measures 6 in. in diameter and 7 in. in length, with three 4½ in. legs attached to the base to give the proper stand-off distance. An 80° sheet steel cone is fitted to give a cavity-charge effect. A removable cap on top of the container covers a primer tube containing the primers into which the detonator is inserted.

From time to time, other sizes of Beehives have been used by the British Army, as follows:

16-25-lb. Demolition Charge No. 6 Mk I
30-lb. H./C. Demolition Charge Mk I (Nesting)
35-50-lb. Demolition Charge No. 7 Mk I
60-lb. Demolition Charge No. 8 Mk I
75-lb. H./C. Demolition Charge No. 4 Mk I

Arched Charges

25-lb. Arched Demolition Charge No. 2 Mk I (General Wade)—This charge is an arched linear charge, containing 26 lb. of Pentolite. The container is made of tin-plate, and measures 9 in. x 12¾ in. x 6⅜ in. The container is semi-cylindrical, with a 2¼ in. radius arch fitted into

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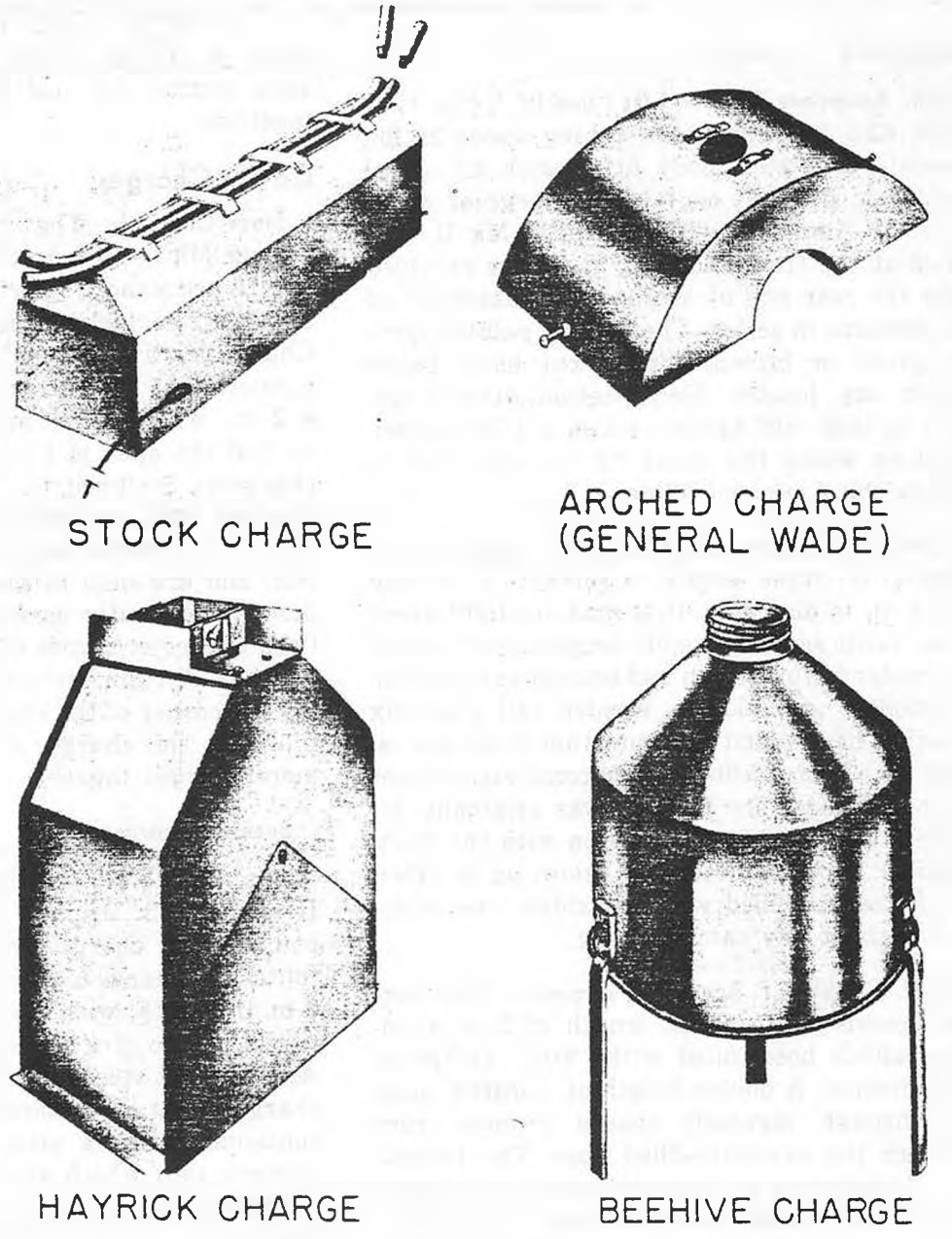


Figure 284—Examples of Army Cavity Charges

the bottom to give the cavity-charge effect. The charge is designed to be a general purpose charge, combining some of the advantages of the coned type of charge with those of the ordinary contact type. It is thus adequate to effect serious damage against the majority of targets likely to be encountered by assault troops, i.e., against reinforced concrete and armor plate up to 2 in. in thickness.

26-lb. Arched Demolition Charge (M.S. Shape)—This charge is a slight adaptation of the General Wade; see page 445. The thickness of the explosive at the top has been reduced to 2½ in., and the base pressure charge has been increased by about 50%, giving the following dimensions, 9 in. x 17 in. x 5 in.

Hayrick Charges

15-lb. Hayrick Demolition Charge No. 3

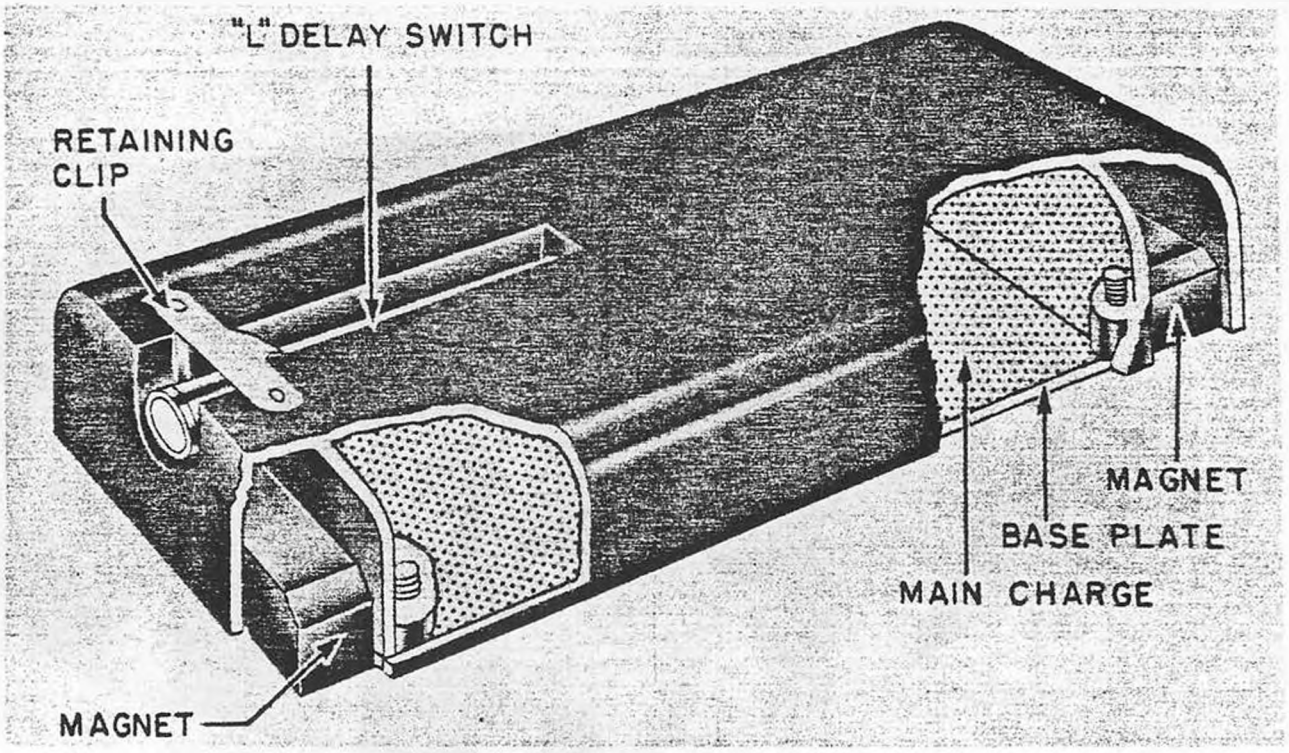


Figure 285—Army Magnetized Charge—Clam Mk III

I—The Hayrick charge is a linear cavity charge designed to cut the tension reinforcing bars of reinforced concrete structures. It consists of a mild steel body containing the H.E. filling, with a blast plate fitted internally to provide the cavity-charge effect. The body is rectangular in shape, measuring 11¼ in. x 6 in. x 17½ in. One end is open and formed with flanged end plates, while the opposite end is shaped to an apex and carries two detonator sleeves, a sealing plate, and the fuze support. About 15 lb. of Pentolite make up the H.E. filler, bringing the total weight to about 27½ lb.

Magnetized Charges

Clam Mk III: The Clam is a small time bomb with a magnetic base, which enables it to be attached instantly to any flat iron or steel surface, such as engine blocks, railroad tracks, steel plate, etc.

The body is a black plastic box with rounded corners, measuring 5¾ in. x 2¾ in. x 1½ in. At each end of the box is a magnet compartment, in which the two magnets are loosely mounted so that they can grip an uneven surface. The center compartment of the box contains about 8 oz. of the H.E. filler, usually Tetryl/TNT 45/55. The box is closed by a flat lid held in place with four screws.

A standard L. Delay Switch No. 9 Mk I, with a Detonator No. 27 attached, serves as the delay initiator. It slips into a groove in the top part of the body and is held in place by a small clip.

Limpet Mk III: The Limpet is a small, self-contained, delay-action mine with a magnetic base, which allows it to be fitted instantly to any iron or steel target, such as a tank or the hull of a ship.

The Limpet is designed to function either on land or under water, and carries a charge of 3½ lb. of H.E. filler, usually Tetryl/TNT 45/55, which is sufficient to pierce 60-mm plate. Exceptionally powerful segmental magnets, flexibly mounted, allow it a firm grip even on uneven surfaces. It will remain in place on the average vessel at speeds up to 16 knots.

The explosive container of the Limpet Mk III is a separate unit, which can be detached from the magnet ring so that the device can be used

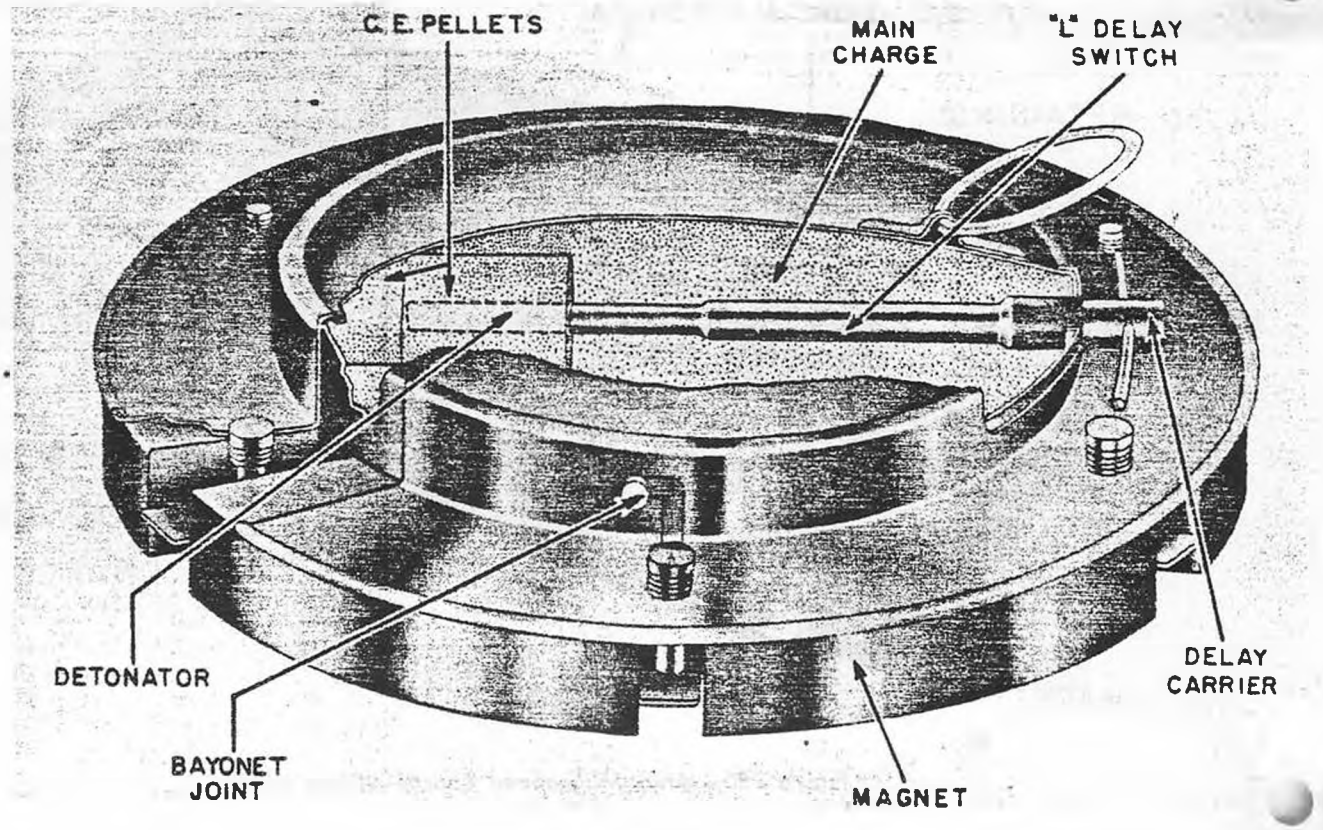


Figure 286—Army Magnetized Charge—Limpet Mk III

without magnets if desired. This container weighs about 4¼ lb. filled. The magnet ring weighs 5¼ lb., bringing the total weight of the device to 9½ lb. A carrying ring is fitted to the top of the Limpet body.

A standard L. Delay Switch No. 9 Mk I, with a Detonator No. 8 attached, serves as the delay initiator. It is inserted in a special holder, which gives a watertight joint when inserted in the magazine.

The earlier Limpet Mk II was fitted with two magazines, allowing the use of a duplicate igniter system to provide against possible failure.

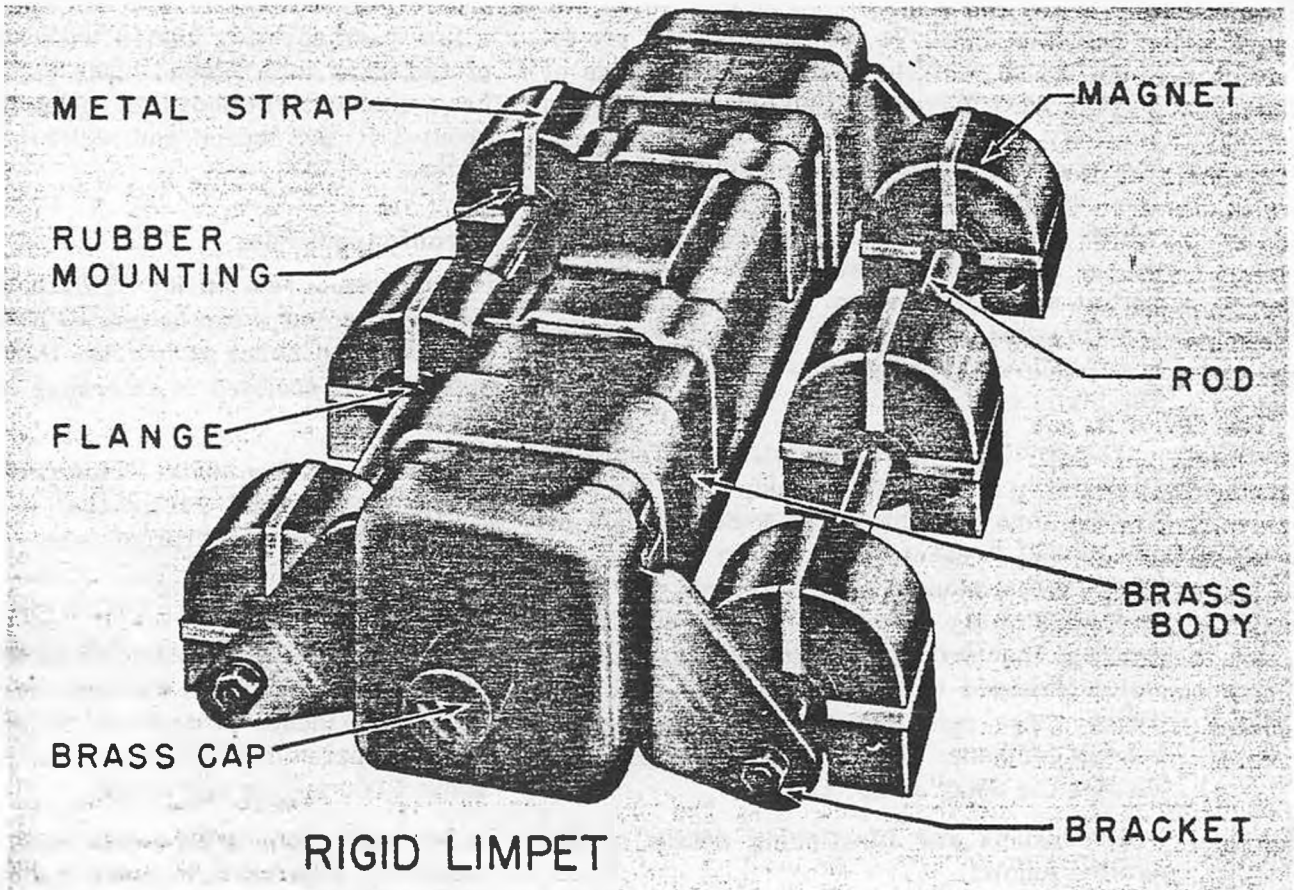
Rigid Limpet: The British Rigid Limpet is designed for the destruction of tanks or other steel structures. The device is painted field gray and consists of a rectangular box of sheet brass, 8¼ in. long x 2½ in. wide x 2½ in. deep.

The box contains a charge of 2.5 lb. of plastic H.E., moulded to accept a detonator at each end.

A pair of brass brackets are riveted to either side of the brass body, and a brass rod is secured between each pair of brackets. To each rod are fitted three permanent U-shaped magnets, each fastened by metal straps to a rubber mounting. These magnets are retained in position by flanges on the rod. The rubber mountings allow limited movement to the magnets, so that the Limpet can be readily attached to uneven surfaces.

An internally threaded brass cap provides a filling hole. A threaded adapter fixed centrally to the brass filling cap and another threaded adapter fitted to the other end of the body provide means for inserting the A.C. Delay Igniter Mk I, with which the Limpet is fuzed.

This initiating mechanism, used only with the Rigid Limpet, is a chemical-type long-delay device, consisting of a brass body containing a spring-loaded striker. The head of this striker is sunk in a celluloid disc, retaining the striker under spring compression.



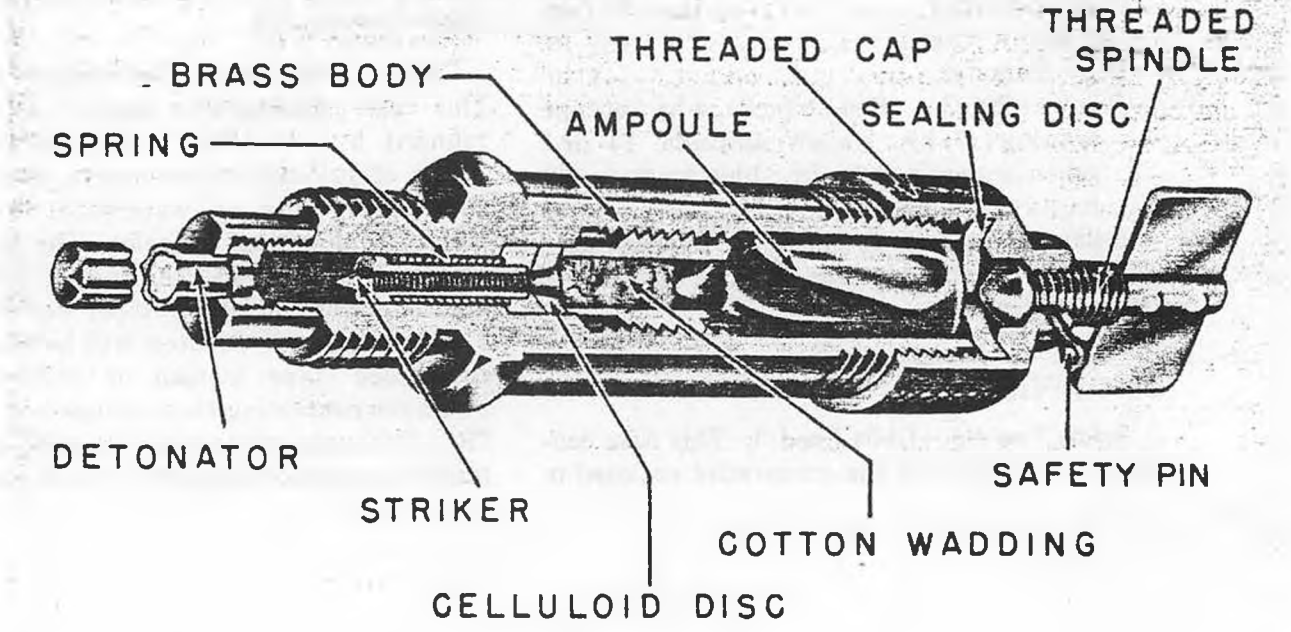


Figure 287—Army Magnetized Charge—Rigid Limpet and Igniter

Immediately above the celluloid disc are located cotton wadding and a glass ampoule of solvent, accommodated in an enlarged recess in the body. The top of the body is threaded externally to receive a threaded cap. Screwed into the center of the cap is a threaded spindle, which bears on a rubber sealing disc. To the top of the spindle is attached a wing bolt to permit manual operation. A safety pin pierces the threaded spindle and the cap, preventing the spindle from being screwed down as long as the pin is in place.

The device is put in operation by removing the safety pin and screwing down the threaded spindle, thus crushing the ampoule and allowing the solvent to saturate the cotton wadding and work on the celluloid disc. Eventually the celluloid is sufficiently softened to release the striker, which is then forced by its spring into the detonator threaded to the lower end of the body. Delay times can be varied by changing the solvent ampoule. The color of the ampoule indicates the delay at 20° C.

Dimensions and functioning details of the igniter follow:

Over-all length .....5½ in.
Detonator length .....4½ in.
Body diameter .....1 in.
Delay at 20° C....Red ampoule, 4 hr.; orange ampoule, 7 hr.; yellow ampoule, 14 hr.; green ampoule, 22½ hr.; blue ampoule, 36 hr.; violet ampoule, 4½ days

Delay times will increase at temperatures above 20° C., and decrease if temperatures are below that point.

Safety Fuse

Safety Fuse No. 11 Mks I and II: This fuse consists of a column of fine gunpowder enclosed in a jute yarn covering coated with bitumen and protected by a varnished black tape. The fuse has a diameter of about 0.21 inches. It burns at about 2 ft. per second and will function under water.

Instantaneous Fuse

Instantaneous Fuse Mk III: This is not a detonating fuse, but it can be ignited by safety fuse or flame, and burns at not less than 90 ft. per second. It is enclosed in an orange colored tape binding.

Instantaneous Fuse Mk IV: This fuse is similar to the Fuse Mk III, except that it is enclosed in a red colored, waterproof tape.

Detonating Fuse

TNT Instantaneous Detonating Fuse Mk III (F.I.D.): This fuse consists of a lead-and-tin alloy tube, about 0.23 inches in diameter, filled with specially prepared TNT. It detonates at a rate of about 5,000 meters per second.

Cordeau-Bickford Instantaneous Fuse: This fuse consists of a lead tube completely and uniformly filled with TNT. It detonates at about 4,500 meters per second.

Cordtex Instantaneous Detonating Fuse Mk IV: This fuse consists of a core of P.E.T.N. surrounded by cellophane tape and enclosed in layers of jute and cotton yarn, contained in a tubular covering of waterproof composition, which is aluminum in color. The external diameter is 0.19 inches. The rate of detonation is approximately 20,000 feet per second.

Some issues of Cordtex will be covered with rubberized tape instead of cellophane tape. Packages containing these issues will be marked "R". Packages containing Cordtex covered by plastic instead of bitumen will be marked "P".

Part 7—Chapter 4

NAVY DEMOLITION STORES

Detonators

No. 21 Mk VII

Type ..... Electric
Material .....Copper tube
Explosive ..... A.S.A./C.E.
Explosive weight ..... 33 grains
Remarks.....Obsolescent; to be replaced by No. 6 Briskas

No. 25 Mk II

Type ..... Non-Electric
Material ..... Copper tube
Explosive .....A.S.A./C.E.
Explosive weight ..... 33 grains
Remarks.....Obsolescent; to be replaced by No. 6 Briskas; painted red

Briska No. 6 Mk II

Type ..... Electric
Explosive ..... A.S.A./R.D.X.
Explosive weight ..... 15 grains

Briska No. 6 Mk III

Type ..... Electric
Explosive ..... A.S.A./R.D.X.
Explosive weight ..... 15 grains
Remarks.....Same as No. 6 Mk III, but has 36-in. leads; limited use in salvage work

Briska No. 6 Mk II

Type ..... Non-Electric
Explosive .....A.S.A./R.D.X.
Explosive weight ..... 15 grains

I.C.I. Gasless Delay No. 1

Type ..... Electric
Explosive .....A.S.A./C.E.
Remarks ..... 1 sec. delay

Primers

C.E. Primers for Shipboard Use

Mks I and II—The Primer Mk I consists of a watertight cylindrical brass case, 2.25 in. x 1.18 in., containing 1 1/7 oz. of C.E. The Mk II is identical to the Mk I, except that as a wartime measure a paper wrapper has been substituted for the brass case. The Mk II is not waterproof, but may be used under water provided immersion does not exceed one hour.

Mk III—This primer is identical in dimensions and weight to the Mk II, but the detonator recess is of smaller diameter to fit the Briska Detonators No. 6 and the I.C.I. Gaseless Detonator No. 1.

Polar Blasting Gelatine Primers for Shore Demolition

These two primers are plastic; thus have no recess provided for the detonators. The primers are paper-wrapped in cartridges. The 2-oz. primer measures 2¼ in. x 1⅛ in., while the 4-oz. primer measures 4 in. x 1¼ in. These primers are for shore demolitions only and are not for shipboard issue.

Explosive Charges

C.E./TNT Block Mk I

Explosive weight ..... 14 oz.
Length ..... 4½ in.
Width ..... 2¼ in.
Height ..... 1⅞ in.
Total weight .... 14 oz.
Container ..... Metal
Remarks.....May be made up into a 25-ft. chain demolition charge.

TNT Block Mk I

Explosive weight ..... 1¼ lb.
Length ..... 6 in.
Diameter ..... 2.4 in.
Total weight ..... 1¼ lb.
Container ..... Paper
Remarks....Usually inserted in a TNT Container Mk I, made of sheet steel.

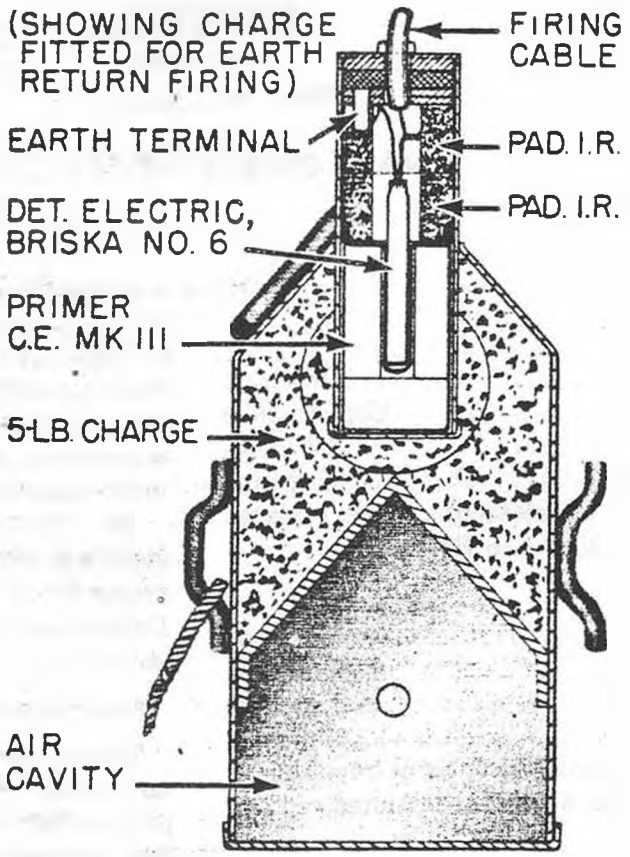


Figure 288—Navy 5-lb. Cavity Demolition Charge Mk I

Amatol Charge Mk I

Explosive weight ..... 10 lb.
Length ..... 8.3 in.
Diameter ..... 6.5 in.
Total weight ..... 18½ lb.
Container ..... Mild steel
Remarks.....Receives one 4-oz. primer and a Detonator No. 6.

Amatol Charge Mk I

Explosive weight ..... 25 lb.
Length ..... 18.2 in.
Diameter ..... 6.6 in.
Total weight ..... 39½ lb.
Container ..... Mild steel
Remarks.....Receives two 4-oz. primers and No. 6 detonators.

Amatol Charge Mk II

Explosive weight ..... 25 lb.
Length ..... 18.5 in.
Diameter ..... 6.6 in.
Total weight ..... 41 lb.
Container ..... Mild steel
Remarks....Receives one 1¼-lb. TNT block.

Amatol Charge Mk I

Explosive weight ..... 50 lb.
Length ..... 18.5 in.
Diameter ..... 9 in.
Total weight ..... 70½ lb.
Container .....Mild steel
Remarks.....Receives two 4-oz. primers and No. 6 detonators.

In addition to these, heavy demolition is sometimes accomplished by adapting Depth Charges Mk VII, Mk VIII, Mk XI, and D Mks I and II, and Mine Charge Case Mk V for demolition firing.

Cavity Charges

5-lb. RDX/TNT Cavity Demolition Charge Mk I: This charge is a linear cavity charge designed for cutting chain, steel wire rope, steel plate, etc. The charge consists of approximately five lb. of 60/40 RDX/TNT. The primer pocket will accept either a C.E. Primer Mk I, II, or III, or a 2-oz. Polar Blasting Gelatine Primer. The charge has been designed for use with Briska Detonators No. 6, and is not suitable for use with Detonators No. 21 or No. 25. An I.C.I. Gasless Delay Detonator No. 1 may be used when the charge is fitted with a C.E. Primer Mk III.

The thin sheet-steel case encloses the watertight cavity. The case and primer-tube bung are watertight, allowing the charge to be used in depths up to three fathoms. Two cleats and 6-ft. lanyards attached to the charge enable it to be quickly secured to its target.

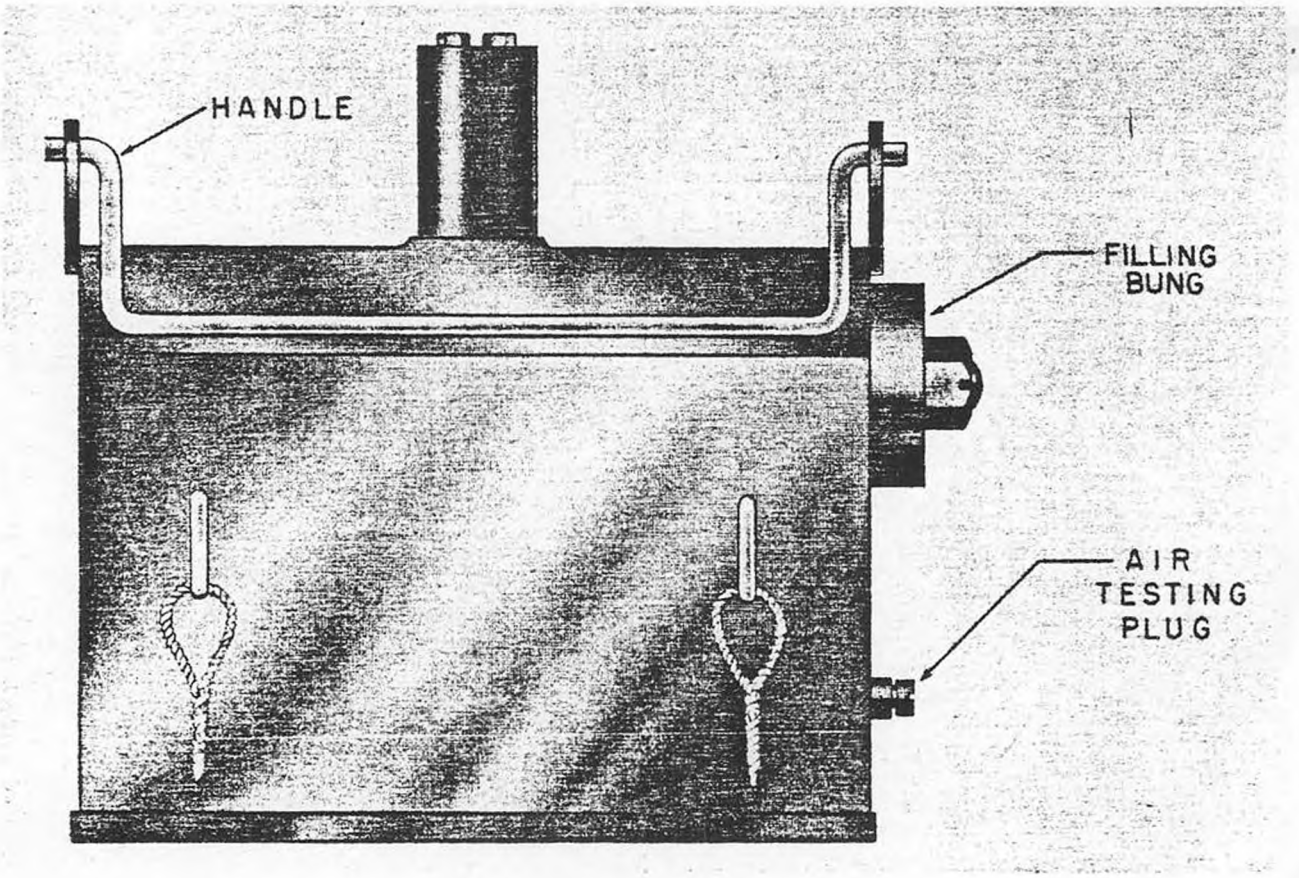


Figure 289—Navy 5-lb. Cavity Demolition Charge Mk I

Safety Fuse

Safety Fuse No. 9 Mk IV: This is a standard service fuse, frequently known as "Bickford's", which is used for Detonators No. 25. The rate of burning is approximately 2 feet per minute. This fuse is of larger diameter than No. 11, or No. 100, and when used with Briska Detonators No. 6, the outer layer must be peeled back before the fuse can be inserted in the detonator.

Safety Fuse No. 11 Mk II: This fuse consists of a column of fine gunpowder enclosed in a jute yarn covering coated with bitumen and protected by a varnished black tape. The fuse has a diameter of about 0.21 inches. It burns at about 2 feet per second and will function under water.

Safety Fuse No. 100: This fuse is smaller in diameter than service safety fuse and can be used only with Briska Detonators No. 6. The burning rate is approximately 2 feet per minute. The fuse is weather-proofed, not waterproofed, but will burn under water not exceeding 10 fathoms in depth, provided it has been immersed for more than 15 minutes.

Detonating Fuse

TNT Instantaneous Detonating Fuse Mk III (F.I.D.): This fuse consists of a lead and tin alloy tube, about 0.23 inches in diameter, filled with specially prepared TNT. It detonates at a rate of about 5,000 meters per second.

Cordtex Instantaneous Detonating Fuse Mk IV: This fuse consists of a core of P.E.T.N. surrounded by cellophane tape and enclosed in layers of jute and cotton yarn, contained in a tubular covering of waterproof composition, which is aluminum in color. The external diameter is 0.19 inches. The rate of detonation is approximately 20,000 feet per second.

Some issues of Cordtex will be covered with rubberized tape instead of cellophane tape. Packages containing these issues will be marked "R". Packages containing Cordtex covered by plastic instead of bitumen will be marked "P".

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